F2206
Cop. 1

FARMERS DIGEST

AUGUST–SEPTEMBER, 1943

Volume 7
Number 4

25c a Copy
$2.00 a Year

Better Hay from Late Afternoon Mowing ... *American Agriculturist* 1
Summer Comfort for Dairy Cows ... *Successful Farming* 3
Meat Without Ration Points ... *N. J. Farm and Garden* 7
Home Food Supply Program ... *Southern Agriculturist* 10
Keeping Farm Machinery Fit ... *Ohio Farmer* 14
Grainless Dairy Rations ... *Capper's Farmer* 17
Doubles Egg Production in Ten Years ... *Nebraska Farmer* 21
Southdowns for Spring Lambs ... *Sheep Breeder* 24
Milk Cows for Rent ... *Farm Journal and Farmers Wife* 27
Buck Rakes ... *New England Homestead* 28
Healthy Pullets Are Needed This Year ... *Rural New-Yorker* 31
Temporary Pastures ... *Soil Conservation* 35
Reduction of Nematode Infestation ... *Texas Farming and Citriculture* 39
The Weather Man ... *Missouri Ruralist* 43
Grass Silage ... *Jersey Bulletin* 47
Farm Garden Irrigation ... *Electricity on the Farm* 54
Developing Chick Becomes a Laboratory ... *American Poultry Journal* 57
More Pigs Saved ... *Hog Breeder* 59
Viruses, Bacteria and Fungi ... *Farmer's Advocate* 60
Waxy Kafir ... *Farm and Ranch* 63
Inspect Your Wiring ... *Michigan Farmer* 65
More Acres Per Machine ... *Iowa Farm Economist* 67
Soil and the Americas ... *Land Policy Review* 71
Save That Manure ... *Western Farm Life* 76
Prize Essay ... *Karl Swain* 79
Alyce Clover Gets Wet ... *Better Crops* 82
For the Farmer's Library ... 85

LIBRARY
CURRENT SERIAL RECORD
AUG 2 - 1943
U.S. DEPARTMENT OF AGRICULTURE

The Farmer's Digest

EDITORIAL STAFF:

Editor—L. Bush-Brown Assistant Editor—C. Leavitt Dyer
Business Manager—A. E. Heick
Associate Editors—
John A. Andrew, Jr., James Bush-Brown, Ruth Patrick

ADVISORY EDITORIAL STAFF:

William A. Albrecht
Chairman, Department of Soils
University of Missouri

John D. Beck
Professor of Veterinary Medicine
University of Pennsylvania

Hugh H. Bennett
Chief, U. S. Soil Conservation Service

D. B. Johnstone-Wallace
Assistant Professor, Department of Agronomy
Cornell University

H. J. Reed
Dean of the College of Agriculture
Director of the Experiment Station
Purdue University

W. T. Spanton
Chief, Agricultural Education Service
U. S. Office of Education

Howard B. Sprague
New Jersey Agricultural Experiment Station

M. L. Wilson
Director of Extension Work
United States Department of Agriculture

The Farmer's Digest
Published Monthly at Ambler, Pennsylvania
by the Farmer's Digest, Inc.

25c a Copy *1 Year $2.00*
2 Years $3.50 *3 Years $5.00*
Foreign and Canadian Subscriptions $2.50 a Year

Entered as second-class matter at the Post Office at Ambler, Pa.,
May 5, 1937, under act of March 3, 1879

The Farmer's Digest

Volume 7 August-September, 1943 Number 4

Better Hay from Late Afternoon Mowing

Condensed from American Agriculturist

Otis F. Curtis

Botany Department, Cornell University

It is a well-known fact that all the carbohydrate manufactured by green plants is produced from the raw materials, carbon dioxide and water. It is known that this manufacture of carbohydrate will take place only while the plant is exposed to light, and that the manufacture of all other organic materials, either by plants or animals, is dependent on a supply of this carbohydrate. It is also known that some of the carbohydrate food made during the day is used up during the night by the growth and respiration of the plant itself, although it is not known how much of the carbohydrate made during the day is commonly used up or disappears during the night from the leaves and shoots.

From the known facts, one would expect that there would be a maximum food content in hay or other forage material that is cut in the middle or late afternoon of a bright day and a minimum food content if the crop is cut the first thing in the morning. However, very little attention seems to have been paid to the possible bearing of these facts on practices of harvesting farm crops.

During the summer of 1942, a large number of small plots of alfalfa were harvested morning, noon and afternoon on four different days in June, and second cuttings were made mornings and afternoons in August. All the samples for the June harvests and some of the samples of the August harvest were quickly dried by the use of artificial heat. Some of the samples of the August cuttings, however, were dried naturally under field conditions. *In every case the sugar and starch content of the material cut in the afternoon was much higher than of that cut in the morning.* This carbohydrate content was always higher in the afternoon cuttings, independently of whether the carbohydrate was expressed as percentage of dry weight, percentage of fresh weight or as pounds per acre. Those sets cut in the afternoon contained from 62 to 125 pounds more of sugar and starch per acre than those cut early in the morning. The average of 8 different sets of morning and af-

Reprinted by permission from the American Agriculturist, Ithaca, N. Y., July 3, 1943

ternoon cuttings, with 7 to 9 replications for each cutting, showed an advantage in favor of the afternoon cuttings of 92 pounds or 90 per cent more sugar and starch per acre, and 713 pounds or 25 per cent more total dry matter per acre.

In the material that was allowed to dry naturally in the field, as well as in the material artificially dried, it was found that the total carbohydrate and the total dry matter were much higher in the late afternoon cuttings than they were in cuttings made early in the morning no matter whether the morning cuttings were made on the same day before the afternoon cuttings, or the next morning following the afternoon cuttings.

Our analyses of grass are less complete than those for alfalfa, but they clearly indicate that the afternoon-cut material, like the alfalfa, has from 50 to nearly 100 percent more digestible carbohydrate than that cut in the early morning. When cut for silage, this same principle undoubtedly will apply to corn also.

No matter whether the material is to be dried as hay or placed in the silo, if one can increase the digestible carbohydrate by only 25% (to say nothing of a possible 50% or more) merely by delaying the cutting to mid or late afternoon, it is well that the farmer be acquainted with these facts. Knowing that the sugar and starch content of all living materials are likely to be at a minimum the first thing in the morning and at a maximum in the middle or late afternoon of sunny days, he can take advantage of those facts in adjusting his harvesting practices. Not only is the actual sugar and starch content higher in the afternoon, but the actual water content is usually lower; so unless it rains or is cloudy in the afternoon, the percentage of water is almost invariably lower in the afternoon.

If there has been a day or two of cloudy weather, especially if the temperature has been high, the food content the first thing in the morning is likely to be at a lower minimum than on a morning following several clear days, especially if the nights are cool; so if the weather of previous days has been warm and cloudy, it is still more important to wait until afternoon before cutting.

When dried under the same conditions, the actual rate of drying of afternoon-cut material is somewhat slower than that cut early in the morning. This is due to the fact that the material cut in the afternoon has a higher sugar content, and the presence of the sugar in the cells slows up the rate of water loss from them. The advantage of an appreciably higher carbohydrate content of material cut in the afternoon is likely to more than offset slight disadvantage of slower drying.

Summer Comfort for Dairy Cows

Condensed from Successful Farming

I. W. Rupel
University of Wisconsin

YOUR cow may look like the Queen of Sheba lying there in the shade. Nothing to do but chew her cud—no harness to wear, no loads to pull. She's the envy of the barn lot. But she is actually working for you every minute. She has a big job digesting that food and converting it into milk, although much of the task can be done while lying there in the shade.

The greater her ease the more completely she can devote herself to the main job and the more money she can make for you. True comfort arises from a sense of satisfaction of appetite with respect to both feed and water and a sense of physical well-being produced by a suitable temperature in an environment free from irritation or disturbance.

While we have not reached the point of cooling cow stables with refrigerated air, we may well give thought to combating high temperatures by other means. Ideally, the cow is stimulated to her best production by a feed intake that reaches the maximum of her capacity. If the quality of feed offered is below par she is likely to eat less of it and consequently produce less.

It is a fact that the best of feed does produce heat as a by-product in the process of being digested and utilized for milk. This in winter may warm the cow, but in summer it is a waste that must be dissipated through the lungs and skin. As a result, the high-producing cow with her greater feed consumption is at a disadvantage in hot weather as compared with poorer individuals or dry cows that need little more than their maintenance requirements.

Research work under controlled conditions has shown that when the thermometer registers 85 degrees Fahrenheit the high-producing cow is very near the limit of her ability to keep cool without special effort. If the temperature goes higher she must breathe more rapidly, actually pant, to keep her temperature normal. In addition, the cow out in the hot sun may absorb directly still more heat.

Cows do not sweat appreciably,

Reprinted by permission from Successful Farming, Des Moines, Iowa, July, 1943

but some moisture does pass through the skin. It is estimated that somewhat over 30 percent of the body heat loss in warm weather occurs in this way. Whenever the cow fails to eliminate this heat as rapidly as she should, body temperature goes up and a "fever" results. Small wonder, then, that under such conditions appetite falls off and milk flow declines.

Dairymen ponder the question of what is the most comfortable place for the milking herd during the hottest days. The answer will depend on surroundings. If the barn is well ventilated it may be desirable to keep the herd in the stable during the heat of the day and let them graze during the evening and night. Just as the animal heat warms the stable in winter, it will also tend to overheat the quarters in summer unless sufficient ventilation is provided to carry off the excess.

The forced ventilation installed on some farms and the use of electric fans may be an asset, particularly on days when there is little breeze to stir the air. If your stable does not have a moderately high ceiling and cross ventilation, it may not be possible to keep the temperature low enough for comfort. The best choice then may be to keep the stock outdoors, where they have access to shade and to such breeze as Nature provides.

On some farms artificial shades must be built if good shade trees are not abundant. The shady side of the barn may be cut off from the little breeze that may be stirring.

Select a high area or knoll as a site for artificial shade. Here it will be more accessible to any breeze regardless of direction and have better drainage, lessening chances of muddiness from trampling of stock.

The type of construction is not very important provided the shelter is large enough so that air circulates freely among the animals. Also, it is desirable to build the shade eight or 10 feet above ground to give plenty of headroom and permit the body heat to rise and drift away even on sultry days.

Where looks are not important, one may use rough poles for the framework, upon which leafy brush, straw, or marsh hay can be thrown. Where appearances require it, a better looking shade can be built with inexpensive lumber and a simple, conventional, not over-expensive roof. But the essential is shade.

We often overemphasize the importance of the fly menace. Careful studies have shown that flies cause only a small percentage of the decline in milk flow usually observed in midsummer. The hot sun that discourages the cow from going out to graze and the shortage of grass and lowered

palatability are factors that may account for most of the decline in milk production.

The California experiment station conducted a careful study of the types of fly sprays and their effects on cows. It was found that when heavy oil sprays—the only kind that will last some hours—were used, the cows' ability to withstand heat was lowered, and their body temperatures would run up to fever levels when the air temperature was raised above 80 degrees Fahrenheit.

At Iowa, where similarly treated cows were staked out in the sun, body temperatures ran as high as 110 degrees and more when the air temperature reached 94 degrees Fahrenheit. The cows were immediately removed to the shade for fear of heat stroke and death.

When the flies are sprayed directly, a light oil base preparation with high killing power is very useful to control flies at milking time. It is more important to spray the flies than the cows. From experience, dairymen are using sprayers that produce a moderately fine mist, and they spray up toward the ceiling of the stable, filling the air with mist. In this way most of the flies are struck directly or covered as the mist settles.

Such sprays are too light to last very long on the coats of cows when they go out to pasture. Their chief value is in killing flies in the stables and providing peace for the cow and caretaker at milking time. Nothing poorer than AA grade spray should be used.

Three kinds of flies frequent most cow barns. The most numerous is the housefly, a crawling source of irritation. The stable fly lives on blood drawn by biting through the skin. Much can be done to control these pests by keeping all straw and manure piles hauled out during the summer and by cleaning up stacks so that no wet fermenting straw will provide breeding places. Moisture is the big factor and it should be eliminated wherever it is a problem.

The horn fly also bites and sucks blood, laying its eggs in freshly voided manure. No practical means of control through elimination of its breeding place is available, but, fortunately, the number of horn flies is usually too small to be serious.

Darkening the stable by covering windows or painting the glass will discourage the stable fly from entering, but the horn fly goes in with the cow, and the housefly will still gather if there is light enough for the caretaker to work. These facts coupled with need for fullest ventilation may decide one in favor of screening the stable and depending upon the killer-type of spray to keep down the flies that do enter. Electric screens

kill many flies. From the standpoint of sanitation as well as cow comfort, the attack should be concentrated upon the source, the breeding places of flies.

The ideal summer pasture furnishes succulent and palatable grass in such abundance that the cow can get a full feed in a short time, perhaps no more than an hour. She can then seek the shade to lie down and chew her cud. With access to good grazing during the morning, late afternoon, and night, the cow should be able to eat all she can during each 24 hours without doing much if any grazing during the hottest part of the day.

The provision of good drinking water is often overlooked. The hotter the weather, the more important it becomes. Water should be conveniently available so that cows do not have to choose between traveling long distances in the hot sun to get it, or foregoing the drink they want.

Give the cow comfort in terms of abundant food, fresh drinking water, protection from midday heat, and relative freedom from pests. A bit of practical pampering will enable your cow to give you production at her best.

New Name for Fesque

Tall fesque has been renamed and now is called alta fesque, according to agronomists of the United States Department of Agriculture. An old plant, therefore, with a new name, alta fesque has only recently come to the attention of Midwestern farmers because of its adaptability in pasture mixtures. Agronomists expect it to replace orchard grass in some areas and they state further that alta fesque will become a favorite in the blue-grass areas where pastures dry up in the summer. It fits into such a situation because it is deep-rooted and stays green during dry spells, yet is tolerant of wet conditions resulting some years from excessive rain in spring and fall.

—*Successful Farming*

Here's Meat Without Ration Points

Condensed from New Jersey Farm and Garden

Alexis L. Clark

RABBITS have constituted the most universal natural meat supply for animals, birds of prey and man since the dawn of history. In many countries rabbit production for meat and fur is an important branch of the livestock industry. In the United States certain sections have made important developments in the business, notably Southern California.

Today, with the shortage of meat, thoughful people in many places are advocating the raising of a few rabbits as an economical means of adding to the meat supply of families suitably situated. Of course it is known that rabbit fur constitutes over one-half of the number of animal pelts used in this nation. To be sure, it is sold under some forty different names from Siberian-dyed leopard to Alaskan sable.

The New Jersey State Rabbit Breeders' Association started to promote interest in earnest commencing a year ago. The State Department of Agriculture has issued statements regarding the soundness of the family-size rabbitry. Recently the poultry department at the State College in New Brunswick gave a two-day short course in rabbit raising and some eighty men and women registered and enjoyed it.

At present the demand is so keen for well bred and grown stock that practically no supplies are finding their way into dressed meat markets, save a few surplus bucks. The state association has said that 100 new breeders a month would not fill the demand for several years under the present meat situation. But it is emphasized by all who are acquainted with the business and its possibilities that careful attention must be given to foundation stock.

There are two breeds which far surpass all others in popularity for meat and fur demands. They are the New Zealand Whites and the Heavyweight Chinchillas. In the wool branch of rabbit raising, of course, the Angoras are supreme, but this article is not going to touch on that subject. The N. Z. Whites and the Heavyweight Chins have been developed for many years to produce a prime carcass at the early age of eight weeks. Four pounds live

Reprinted by permission from New Jersey Farm and Garden, Sea Isle City, N. J., June, 1943

weight is the goal aimed at by those who grow for this market. The dressed weight is about fifty per cent of the live weight and the retail ceiling price is now fifty-five cents a pound so that strictly from the meat market requirements $1.10 can be expected for young stock at eight to ten weeks of age.

However, this year it is hoped that hundreds of people will start with a trio or two of good foundation stock and raise more breeding stock for others. The demand is out of all proportion to the supply on hand. Most experienced breeders find it almost impossible to replace old stock or to keep any young ones on hand long enough to mature. A trio of rabbits will supply pets for the children, an enjoyable hobby for older folks, fertilizer for the lawn and garden, and some of the most palatable meat found anywhere at a surprisingly low cost. In addition now and for a year or two to come it will not be difficult to sell well-grown stock of good breeding as foundation stock to other breeders at breeder prices.

Rabbits are easy to care for, clean in their habits and interesting in all their ways. Plans for hutches can be secured in bulletin form from State Colleges and other sources. Three-quarter inch mesh wire floors are best, but because of the difficulty in securing such at present, solid smooth wooden floors are used extensively. Litter must be supplied with the latter as dampness is the principal thing to avoid in the rabbitry. There are ready-built hutches on the market. They are made for a single animal or trio or they may be had in batteries of nine or twelve. Some experienced raisers prefer to have them indoors, but many believe it helps health of the stock to keep them out of doors with just enough protection to keep them dry. Cold in our climate need have no detrimental effect if warm nest boxes are provided for the young in cold weather.

Few breeders bother any longer to mix or balance their rations. Nearly all feed manufacturers now provide complete rabbit pellets. They contain ground grains, alfalfa and several minerals and vitamin carriers. Hay may be provided as a supplement or it may be just as well eliminated. Few rabbits will become too fat if allowed free access continuously to such pellets. Where a doe does incline to become too fat the feed container can be removed for part of each day or a limited amount given. Young ones can be safely allowed all they will eat.

There is little trouble from sickness or disease if common sense sanitation is provided and the hutches kept dry and airy.

The young animals may be bred when from six to eight months

old. While until recently it was considered best to plan on only four litters a year, now some experts advocate six and report marked success with this program. The breeders must each be kept in a separate hutch and the young are separated by sex at two months of age. Several young does can then be penned together until they are perhaps four months old. Does kindle or have young thirty-one or thirty-two days after breeding. The number in a litter will vary from four to twelve, averaging about seven. Some breeders allow only six to remain for the mother to nurse while others let her have up to ten. Probably the lesser number will show faster growth. The young will leave the nest and come out soon after they are two weeks old and within another week or two they will begin to nibble on the pellets. They should be weaned at six weeks.

Caution must be used in feeding succulent green foods and in giving pellet-fed stock a change in diet. Rabbits can eat a large variety of food, but once they become accustomed to a steady diet of dry commercial food or grain, changes and variations should be made gradually. A nursing doe, for instance, on pellet ration may die or all of her young may die with one heavy feeding of green food. On the contrary, if given a small amount and increased each day within a month, she can consume pounds of cabbage, lettuce, lawn clippings, etc.

The ceiling price for dressed rabbit meat is fifty-five cents a pound retail and the killing and dressing operations are simple. Probably the cost of raising a four-pound fryer at eight weeks of age may be twenty-five to forty cents. About seventy per cent of the dressed carcass is edible, the highest percentage of any livestock.

Beginners are advised to start with a trio or two bought from someone who is known to have good stock and integrity of character. Many such experienced breeders in New Jersey are members of the state association and may be found in all parts of the state. A visit to some such local rabbitries will be most helpful to anyone starting in the business in a small way.

Home Food Supply Program

Condensed from Southern Agriculturist

Ross L. Holman

NOT long ago some one told me of a Tennessee farmer who bought less than $60 worth of food a year to support a family of six. The rest of it was home grown. Another farmer in the same state purchased nothing in the way of food except seasoning and flavoring. Another one not only produced practically all his food but even the broom with which he swept up the crumbs.

This was the result, to a considerable extent, of Tennessee's Food for Victory program which started in 1939, long before we got to thinking of victory in terms of machine guns and dive bombers. At that time it wasn't considered a war effort at all, but was called the Tennessee Home Food Supply Program. It still goes by that name but it has set the pattern for the victory food campaign in 30 other states.

Put to work by Governor Prentice Cooper, the idea has been carried through 4 years of successful operation by Tennessee's Commissioner of Agriculture C. C. Flanery. As originally planned, the program was intended to give each farm manager as much home grown living as it was possible to make his acres produce. It consisted in getting as many farmers as possible to sign on the dotted line an agreement to produce in so far as they could all their family nutrition, and use for other purposes the money that ordinarily went to the corner grocery. To every family that produced as much as 75% of its needs has been given a handsome Certificate of Recognition.

The idea proved popular and spread like measles. Over 61,000 farm families signed the dotted line pledges that first year and early in 1943 the total number reached 201,500 of Tennessee's 247,000 farmers.

And—it is getting results. The first year 9,000 of the signers won Certificates of Recognition showing a 75% home food production; the second year the number reached 14,000 and the third year 30,000. The way individual farmers are reacting to this campaign is making agricultural history.

There was Jim Andrews, an 83-year-old Wilson County land owner who got the home production fever after a run of bad luck that would have obliterated many

Reprinted by permission from the Southern Agriculturist, Nashville, Tenn., June, 1943

a farmer of less rugged character. In the early part of his life he was caught by a poplar log and was so badly mangled that a leg bone was driven down through his shoe. In the resulting crippled condition he acquired several farms which he stocked and operated with the best machinery. In the post-war depression he was wiped out. About the same time he lost a 19-year-old daughter. In the late '20's a tornado demolished his home and killed his wife. The home erected in its place was struck by lightning and burned to the ground.

When he signed the pledge in the home food program he had 60 acres and on those he and his bachelor son started raising their entire food supply except sugar, coffee, seasoning, etc. They milked 8 cows, kept 100 hens, cured their own meat and used meal and flour ground from their own grain. On additional rented acreage they raised tobacco, wheat, barley, oats, red clover and lespedeza. Needless to say they had plenty of garden and orchard products.

Jim has been sustained by a wonderful sense of humor and strong religious concepts. Though his financial troubles have been devastating he has pulled out of them all without ever having filed a petition in bankruptcy or being sued on a debt.

Some farmers have carried the live - at - home idea far beyond their food needs. Mr. and Mrs. Clay Stark of Perry County own 100 acres, 84 of which are in woods. They have had to get their home made living out of the other 16. On them they have grown everything from a bee to a bungalow. In fact, they have 18 hives of the former and a 4-room structure of the latter. Their bees produce 1,000 pounds of honey per year while their fruits, vegetables and other food products give them a well rounded existence. But the thing that makes this record shine is the log house they extracted from their own woods and erected at a total cost of $197. It is finished inside with 6-inch pine decking beveled and fitted by themselves. The house has built-in fixtures and a single heater heats all the rooms.

In a number of the counties the program has been turned into a contest and awards made to those with the best records. Score cards are checked by the county and home agents without whose co-operation this campaign would have had hard sledding. The awarding of prizes is often the occasion for a public celebration.

In Wilson County the award one year went to Mr. and Mrs. B. L. Trice. They have 55 acres and rarely go to town without carrying something to sell. In addition to the great variety of

fruits and vegetables which they process for year-round use they keep 5 cows that produce both dairy products and veal calves, lots of poultry, enough hogs for meat and practically everything that can be classed as food. Mr. Trice has 20 hives of bees which produce 500 pounds of honey a year for home use and for sale.

He doesn't allow a thing to go to waste. From his orchard, for instance, he not only gets a great quantity of apples for year-round storage and processing but turns the culls into $100 worth of vinegar for cash revenue. He makes his own brooms from an annual acre of broom corn and turns the surplus into 500 salable sweepers a year. In an upstairs room during winter and other bad farming weather he runs a one-man broom factory and his production cost per broom is 2 cents worth of wire and 3 cents worth of handle.

With all this production Mr. Trice hires no help except in peak jobs like hay making. Only one mule is used in making crops.

One family of 4 who really went to town on this program was Mr. and Mrs. Reams Fleming and children who a year or so ago won the Williamson County award. This group lives more unanimously at home than any family I visited. Their score card showed a 98% home living. Their livstock feed, including what was fed to 26 dairy cows, hogs, a lot of sheep, beef and 200 hens, was 100% farm raised.

One of the most spectacular examples of this whole program is the Ben O'Connor family of 6 down in Lawrence County. Back in 1936 the FSA loaned them money to buy a farm and a little later they signed one of the dotted line pledges of the Home Food Supply campaign. Their careers read like a Horatio Alger story. By 1943 they had increased their net worth by $7,000 and their gross income in 1942 was $4,472.09, not including $180 AAA payment.

Their net income was $1,200. From this they made a $700 payment on their farm. Much of the money that Ben lists on his 1942 books as expenses is invested in tools, fencing, general improvements, etc., that are really part of his assets. But even at that only $54.08 during that whole year was paid out for home consumed food. To put it another way, his actual cash expense of feeding each member of his family was around $9.04 a year or about 2 cents a day. His acres did the rest.

The list of food Ben produced in his farm reads like the index of a seed catalogue. I will mention a few of them though it would take far less space to name the foods he didn't raise. Among others were apples, peaches, berries, grapes, plums, rhubarb,

cherries, strawberries, sweet peppers, polk salad, okra and others. The products were canned, preserved, pickled, jellied, jammed and juiced. Their commissary includes 154 quarts apples, 100 quarts peaches, 60 quarts of tomato juice and others running up to a total of 763 quarts of 30 different processed varieties. In addition to these they stored a number of unprocessed foods including 85 bushels of sweet and Irish potatoes, 4 bushels tomatoes, 5 bushels black walnuts, 5 bushels peanuts, 2 bushels pecans, 15 pumpkins, ½ bushel hickory nuts, 4 bushels pop corn, 100 pounds honey and similar products making another total of 19 varieties. With that vast collection of assorted nutrition the O'Connors won't have much use for a ration book.

This list of home grown foods of the O'Connor family is a sample of what thousands of other Tennessee farmers are producing on a smaller or even larger scale under the Tennessee campaign. It has succeeded so well Governor Cooper was made chairman of the National Garden Advisory Committee appointed by the U. S. Department of Agriculture. It is one campaign that has the cooperation of all the agricultural agencies in the state including the State Extension Service, the Farm Security Administration, the State Dept. of Vocational Education, the Farm Bureau and the Farmer's Grange.

Hybrids for Silage

Earlier recommendations of the Agricultural Experiment Station of Illinois on silage corn have been confirmed in their Bulletin 494. They recommend: (1) that a dry-matter content of 30 per cent in the corn crop be used as a gauge for silage harvest; (2) that the kinds of corn that usually mature grain should be chosen for silage purposes; (3) that carefully selected corn hybrids are superior to open-pollinated corn for silage purposes because of their greater yield of forage on a dry-matter basis, higher proportion of the ears in the crop, and greater resistance to lodging.

—*Successful Farming*

Keeping Farm Machinery Fit

Condensed from The Ohio Farmer

G. W. McCuen

Chairman Dept. Agric. Engineering, Ohio State University

THE machinery of today is a far cry from that of the last world war period. The power on farms has materially changed. The transition from animal power to mechanical power has resulted in a complete revolution of tool and equipment design. The tractor of today is a triple power unit: draw bar, belt, and power take-off. The draw bar and power take-off are the two most used and constitute possibly 70 percent of the total use of the tractor.

Machinery of today is more complicated and more efficient than it was 25 years ago. It requires more care and attention than the older types. It is operated at a much greater speed, therefore should be kept in good adjustment for efficient operation.

A study of the repairs on farm machinery reveals that a large percentage of replacements due to wear is caused by lack of adequate lubrication, and breakage replacements were necessitated by lack of proper adjustment, or just keeping bolts tight. The remedy for these two causes is quite obvious. An uncle of mine once said to me, when it appeared that I was using too much oil on the binder, "Well, boy, oil is cheaper than cast iron any day."

The other day I had an opportunity to observe the coulters on a plow. The plow was not an old one, but the coulters made me think of a puppy dog running across the field, just wobbling all over. Why? The bearings had been neglected in receiving proper lubrication and were somewhat worn. These were cone-shaped bearings and all that was needed to put these bearings back in fair adjustment was to tighten the bolt which held them in their respective yokes.

If bolts on any machine, plow, disc, or what have you, are not kept tight, the hole in which the bolt is placed may wear slightly out of round as well as wearing the bolt down, and when it is tightened the friction between the parts is all you have to hold them from moving. It will work loose shortly, and constant adjustment or tightening of the bolt is necessary. The only remedy in this

Reprinted by permission from The Ohio Farmer, Cleveland, Ohio, June 5, 1943

kind of a case would be to drill the hole to the next larger standard size bolt and replace the bolt. Then the parts are held in place by friction and the full size of the bolt. Of course, don't forget the steel lock washer to hold the nut tight.

Rotary hoes and cultipackers are much abused tools on many farms. They are not considered complicated, and therefore are not given much consideration as to lubrication or adjustment. I will venture that there are more rotary hoes and cultipackers in Ohio, if they have been in use for some time, out of adjustment than in good adjustment.

What is that adjustment? It is the spacing of the hoes or wheels on the rear gang in relation to the front hoes and wheels. It is not an uncommon thing to find either a rotary hoe or cultipacker wheel following too close (sideways) to those ahead due to wear on the shaft or the wheel bearings themselves.

The wear on the front set should be adjusted, then the rear gang be spaced properly, that is, follow, halfway between the front wheels, by using spacer washers of proper thickness to compensate for the wear. Quick repair split washers are available for such kind of repairs. Why go over the ground and do a poor job when a simple adjustment will make the unit more efficient?

Did you ever see an operator herding a tractor down corn rows when cultivating? I saw one last year. He had his cultivator gangs set out about 16 inches so that he would not plow out the corn. What was wrong? Several things were out of adjustment, one of which was very important. The steering arm on the front wheel pillar was loose due to the fact that the nut needed tightening. A quarter turn of this nut did the trick at this point, and minor adjustments were made in the steering links. All slack was removed, and the tractor could be driven down the rows and not herded from side to side as before.

That wasn't all that needed the wrench. He had spread the gangs out for safety's sake, and the sweep shovels would not go into the ground: they were "heeled down" instead of slightly pointed down. He had adjusted them above the ground and when the gangs were lowered, they had no suction. Another 20 minutes were spent on the cultivator adjustment and what a difference these few adjustments made in the job of cultivation. This unit was "not fit" for the job due to the fact the operator was always in a hurry.

Tractors, like livestock and crops, respond to good care. In fact, this is applicable to all machinery. Do you realize that when a tractor has operated during a

10-hour day and has burned 20 gallons of fuel, it has had to have the equivalent of 180,000 gallons of air? The air cleaner has a job to do if the field conditions are bad. It should be serviced according to the conditions, and the recommendations of the manufacturer.

Another thing, especially in these times, is to see that the valve clearances are proper. They should not be guessed at but for greater efficiency be made with proper thickness gauges. Valves adjusted too closely will burn out, and replacements are hard to get; besides these things almost always happen at the most inopportune times.

Don't neglect the spark plugs: they, too, need attention. Be sure you have the right plug for the motor you have and the fuel you are burning. Use a "cold type" plug for a high compression engine and a "hot type" for one that burns a heavy fuel. Your dealer has spark plug guide charts which will give the desired information as to type and size of spark plugs. Check the plugs at least every 300 hours for spacing and adjust them to .020" gap.

It has been observed that there are greater grain losses in combining due to "over threshing" than "under threshing." If the conditions are bad, it is best to do the minimum of threshing; that is, leave a grain or so in the heads and not cut up the straw and weeds (if present) so as to handicap separation and cleaning. If operating under adverse conditions, don't expect every grain of wheat to be saved. More wheat can be carried over the racks with the straw, or over the shoe where cleaning takes place, if it is overthreshed. Don't try to save at the spigot and lose at the bunghole. Adjust your machine according to the conditions. Read the manual which came with the machine for detailed instructions.

Do not take chances with machinery by either yourself or your help. See that all moving parts are properly guarded, especially the power take-off shaft. Never make an adjustment or lubricate a machine when in motion. Keep the machinery fit and safe.

Grainless Dairy Rations

Condensed from Capper's Farmer

George A. Montgomery

DAIRY management practices that are sound when feed surpluses are piling up may be wrong in wartime when a protein shortage exists and a grain deficit seems certain. The concentrate-milk price ratio still is such that cows with production bred into them will pay well for grain fed at the rate of a pound to each 3 or 4 pounds of milk produced. Whether they will pay more for it than hogs or poultry is open to question. There are other factors to consider. Dairymen, like other classes of producers, try to direct their business so it will contribute most to successful conclusion of the war, so they want to use grain where it will produce human food of greatest value.

The cow's digestive system, with its ample capacity, is adapted to economical use of roughage. Dairy-bred animals will make a respectable showing without grain, as 2 Indiana herds have demonstrated. One is that of Earnie Halsey, Steuben County, who operates a farm so rolling that soil would wash away under a grain-cropping program. Halsey ties it down with alfalfa and other close-growing crops that cut tillage operations sharply. A small herd of Jerseys is employed to utilize the crops.

One year butterfat average was 355.4 pounds a cow, when that of all herds in Halsey's test association was 329.6; the next year, 309.4 with all herds averaging 338.2. During the 2-year period when Halsey's production virtually tied the average of all herds in the association most dairymen were feeding more than a ton of concentrates a head annually. One cow that was 7 years old when she was put on test produced 426.9, 319.8 and 336.1 pounds of fat, respectively, in the next 3 lactations. Another made 387.2, 370.9 and 412.4 during the same years. One winter Halsey made a test to determine whether production could be increased by adding grain to the rations. Milk flow went up, but not enough to pay the extra costs, so grain was discontinued.

The other Indiana herd, that of Loyd Bennington, Boone County, was started in 1919, when he bought 4 cows — "a Jersey, a black and white, an old underslung brindle, and a common red

Reprinted by permission from Capper's Farmer, Topeka, Kansas, June, 1943

country cow" — to use his own description. He began using Guernsey bulls in 1921; now carries 120 to 130 cows and heifers with 60 in production, and all but 3 or 4 descended from the old grade cows. During the last test year with half those in milk heifers in first or second lactation, the herd averaging 297.8 pounds of fat. More than half the cows in third or later lactations went above 300 pounds. The highest produced 380.8 pounds in 320 days.

Bennington's grade Guernseys get only the grain contained in a small amount of oats hay and that in silage, which is made from a field in which 2 rows of Atlas sorgo are alternated with 2 of corn.

A lazy creek that meanders through his farm made Bennington a grainless dairyman. Bordering it are 150 acres of low, flat land with high water table. Those bottoms are too wet and too weedy to farm, so he turned them to bluegrass, which thrives so well in the environment that the herd went out to pasture 319 of the 365 days in a recent test year. Silage and hay were fed when necessary to hold up production. Supplemental roughage per cow fed in 12 months amounted to 3,154 pounds of silage, which bulked two-thirds sorgo, one-third corn, and 1,860 pounds of hay—clover, mowed oats, alfalfa. When the oats hay was fed, Bennington spread on it 1½ pounds of molasses a cow daily to be sure it was cleaned up. Some of each type of roughage is fed each day.

There are several reasons why Bennington doesn't feed grain. It takes a big herd to utilize grass on his low ground. The 60 cows milked are all that may be handled by family labor, even with help of a milking machine. "If I fed grain," he said, "I would have to employ a hand the year-around. Cows that get only bulky feeds are healthier and longer-lived. I didn't spend a dollar in 1942 for veterinary service; the previous year I had a vet only for calf pneumonia."

The herd produced $6,907.08 worth of milk in the last testing year completed, and only 14 per cent of that amount was needed to pay the feed bill. There are other receipts besides milk checks. Bull calves are sold at birth, but heifers are kept for trial. They bring better prices with test records.

How much production do Halsey and Bennington sacrifice by failure to feed grain? Oregon Experiment Station Bulletin 380 throws some light on that question. It reports a 4-year test with 2 groups of grade Jerseys divided to get equal productive ability. One group got only alfalfa hay and minerals; the other alfalfa hay, minerals and grain according

to production. However, both groups got some pasture the last 2 years. On mature-equivalent basis, grained cows produced 7,181 pounds of milk, 322.2 of fat annually; the hay group 5,875 pounds milk and 266.4 of fat. The heaviest-producing concentrate-fed animals got grain up to 15 pounds a day for short periods at height of milk flow, but total used amounted to but 4.5 pounds a cow daily for lactation periods that averaging 302 days; total, 1,359 pounds a cow annually.

This grain saved 634 pounds of hay and produced 1,306 pounds of extra milk containing 55.8 pounds of fat. That much grain, in mixes varied to suit needs, is sufficient to produce approximately 370 pounds of pork or 225 dozen eggs. At recent prices the pork would be worth about $56.50; the eggs $70.75. Value of the dairy products would depend on the community in which they were sold and whether they were marketed as butterfat or whole milk. To make the same return as pork, milk would have to sell at $4.30 a hundred or butterfat at a little more than $1 a pound. To make it as valuable as 225 dozen eggs, the producer would have to get $5.40 a hundred for whole milk or $1.26 a pound for butterfat.

If the product were used as whole milk or manufactured into cheese, it might contribute as much to the country's essential food needs as eggs, and considerably more than pork. However, if only the butterfat were saved for human consumption, it would contribute less than either the pork or the eggs. Solids other than fat in milk are high in protein, minerals and vitamins, which are among the more essential elements in human diet, and skim milk used as animal feed contributes but a small percentage of its full value to human nutrition.

To evaluate correctly management methods at the Halsey and Bennington farms it is necessary to realize fully the excellent quality both of pasture and roughage used. Halsey grazes off oats seeded as nurse crop for legumes. The rest of the summer his cows pasture alfalfa. He makes hay before protein content declines; carefully saves all leaves. Bennington has permanent pasture on moist soil that keeps grass tender and nutritious. He produces quality clover and alfalfa, and cuts oats hay while leaves are green and the plant is at maximum nutritive value.

Both provide the kind of roughage necessary to grainless dairying. Even a big-barreled dairy cow hasn't capacity for feed to maintain herself and produce milk if pasture is short and low in protein or hay coarse and stemmy. The Oregon hay-fed cows ate an average of 9,478

pounds of alfalfa a year when they got on pasture. Bennington's cows ate less than a ton of hay and slightly more than 1½ tons of silage in a year. Total digestive nutrients in the barn feed total almost exactly a third the amount consumed by the Oregon hayfeds, which means the Bennington cows got fully 65 per cent of their year's feed from green grass. The dairyman who produces high-quality roughage may well use a pencil to determine whether he should discontinue grain to cows that drop below a pound of fat a day. If he does not produce feed of that quality he may well consider whether he can afford to be in the dairy business at all.

Ground Legume Hays Supply Protein

At the Beltsville Research Center, the U. S. D. A. has recently carried on some startling experiments showing that ground legume hays can go a long way towards supplying needed protein for making pork. These experiments were conducted over a period of six years by N. R. Ellis, J. H. Zeller, and J. X. King, and their summary of results is shown in the following paragraph:

The results are reported of experiments on pigs fed from weaning to market finish at 225 pounds on diets containing 0, 5, 10, 15 and 20 per cent respectively of ground alfalfa, sericea, and soybean hays. Somewhat more rapid gains were secured on the 5 and 10 per cent than on the other levels. Up to the 10 per cent level the ground hays effected an appreciable saving of concentrates. The soybean hay stood out as especially valuable in this respect. The alfalfa was somewhat less valuable while the sericea ranked as a poor third. These rankings of relative values need to be taken with some reservation, since the 3 forages were not fed together within a single experiment but over a period of 6 years. The greater use of ground soybean hay is suggested, however, on farms where this forage is available. —*Hog Breeder*

Doubles Egg Production in Ten Years

Condensed from Nebraska Farmer

Edw. A. Wolfe

North Platte Experiment Substation

THE poultry plant at the North Platte Substation was established in 1919. The first project was an attempted comparison of the production of various breeds of chickens. Hatching eggs were bought, the chicks raised, the pullets housed in the fall, and a record was kept of the eggs produced by each breed. No effort was made to improve either the type or production of any of the breeds, and average production remained consistently low.

The production per hen during these years was as follows:

1920	86.6 eggs
1921	119.0 eggs
1922	98.5 eggs
1923	119.5 eggs
1924	102.1 eggs
1925	121.7 eggs
1926	128.7 eggs
1927	127.5 eggs
1928	135.1 eggs
1929	114.1 eggs
1930	123.5 eggs
1931	140.0 eggs
1932	131.8 eggs
1933	132.3 eggs

In 1933, a beginning was made in improvement by selection on the basis of production. This was also the first year of the Nebraska Flock Testing Project. This was a cooperative project between the North Platte Substation, the Poultry Husbandry department of the College of Agriculture, and various owners of approved flocks over the state. The project served as a gauge by which each owner could measure the success or failure of his efforts to improve his poultry.

Trapnesting was used to secure individual production records of each pullet of all entries. While trapnesting involves a considerable amount of labor and detailed supervision, it is the surest and most reliable method of securing information for selection. The year by year increase of production in the Substation flocks indicates the value of individual records. It will be noted that there was some improvement in production before trapnesting was adopted, but it was very slow.

Starting in 1933, the flocks were culled as carefully as possible. The production of 1934 and thereafter indicated that addi-

Reprinted by permission from the Nebraska Farmer, June 5, 1943

tional selection on the basis of production records would bring desired results much more rapidly. Average production for the years that followed was as follows:

1934	142.4 eggs
1935	153.1 eggs
1936	153.1 eggs
1937	184.3 eggs
1938	186.3 eggs
1939	186.3 eggs
1940	176.9 eggs
1941	199.3 eggs
1942	195.9 eggs

This production has come from a flock that averaged about 1,000 birds. Approximately 40 percent of these have been heavies and 60 percent Leghorns. Thus, in ten years, the average production of each hen has been raised from 132.3 eggs in 1933 to 199.3 in 1941—an increase of 67 eggs per hen. In other words, the increase in the past ten years has been almost as much as the total average production in 1920.

During these years, efforts have been confined largely to White Leghorns and White Rocks. The high individual 365-day record for the White Rocks is 286 eggs, and for the Leghorns, 313 eggs. Cockerels have been selected on the basis of type and production of the dams. For the first few years in the White Rocks, no cockerels were kept unless the dam had produced at least 180 eggs in the previous year. With Leghorns, the dams must have produced at least 200 eggs. During later years, these requirements were raised to 200 and 240 eggs respectively. When the project was ended in 1941, no Leghorn cockerel retained in the flocks had in his four-generation pedigree a dam with less than 240 eggs, and most of them had produced considerably more.

Other desirable characteristics as well as type and production were given consideration. If daughters of certain cockerels proved to be consistently low producers, they were discarded.

Hatchability of eggs, livability and general vigor of chicks, early development, and low mortality rates in the laying houses were also considered when selecting hens and cockerels for the breeding pens of the next season. Early development is important as it usually means earlier and more profitable production. In the 1942 season, White Leghorns came into production during their fifth month, and White Rocks during their sixth month.

Due to a shortage of labor, trapnesting was discontinued in 1941 before that year's records were complete. However, by this time, at least part of the undesirable lines of breeding had been weeded out, and plans for 1942 were made on approximately the same pattern as in the previous years.

These birds have at no time been pampered. In fact, many farmers now have better houses for their hens than those at the Substation. The eggs were usually hatched at a local hatchery. The chicks are hovered with kerosene brooders. As soon as weather permits, the pullets are moved out on range where they are kept until transferred to the laying houses in the fall.

Feeding and cleanliness are two large items in general poultry management. For several years the "8-S" mash mixture has been fed. This mash is fed the chicks during the brooding stage and continued on through to the laying houses. It is of course supplemented with a grain mixture which usually consists of equal parts cracked yellow corn and whole wheat.

Due to shortages of some feeds or prohibitive prices, changes have been made in the mash mixture from time to time. The mash at present in use is made up of the following feeds:

310 lbs. ground yellow corn
200 lbs. shorts
100 lbs. bran
100 lbs. alfalfa meal
100 lbs. ground oats
100 lbs. meat scrap
50 lbs. soybean meal
20 lbs. limestone
10 lbs. salt
10 lbs. cod liver oil

This mash has a protein content of approximately 18 percent. Water and oyster shell are always available.

Silage Preservation

It is advisable to use a preservative on all cereal and hay or grass crops that are cut green and stored in the silo. Molasses or cereal grains are satisfactory preservatives. Dry hay can also be used. The following rates of application are suggested:

Molasses — 60 to 100 pounds per ton green material.

Corn and cob meal — 200 to 250 pounds per ton green material.

Ground cereal grains — 200 to 250 pounds per ton green material.

Dry hay—300 pounds chopped hay per ton green material.

—N. J. Farm and Garden

Southdowns for Spring Lambs

Condensed from Sheep Breeder

Dean L. J. Horlacher

University of Kentucky

WHEN one thinks of quality spring lambs it is natural to conjure up a vision of those trim, neat and tidy lambs that bear the unmistakable stamp of a Southdown sire. Ever since the days of Ellman and Webb this breed of sheep from the chalky hills of southern England has been bred and developed from the standpoint of the most meat possible in a given amount of body area. And this characteristic is transmitted to the lambs with great consistency.

Why is it that the Southdown is one of the most prepotent of all the breeds of sheep? The geneticist would explain this phenomenon by stating that these sheep are more homozygous than most other breeds. Putting it in simpler language, the Southdown breed was formed out of native sheep, the best being selected and bred to the best, and there was little or no introduction of outside blood. This policy has been followed since the time of the Revolutionary War, making the Southdown one of the oldest breeds and one of the purest breeds. It is natural then, that with these good characteristics concentrated and fixed, the blood of the Southdown should be dominant when it is mixed with that of other sheep. This is especially important in producing grade lambs for market.

It is relatively easy for a purebred sire to overcome the defects of the common ewe, for she has no characteristics that are strongly fixed. But the well-bred western ewe presents a more difficult problem. She is strong in the blood of such improved breeds as the Hampshire, the Rambouillet, and the Delaine. One of these, the Rambouillet, is also an old breed and, like the Southdown, very prepotent. When these two breeds are mixed there is a battle for supremacy and any lesser breed than the Southdown might have to retreat.

Southdowns mate well with sheep of most other breeds, but they seem to do especially well when crossed with either purebred or grade Hampshires. Range ewes

Reprinted by permission from the Sheep Breeder, Chicago, Illinois, June, 1943

containing Hampshire and Rambouillet blood make excellent mothers for lambs sired by Southdown rams. This combination gives the ruggednes and vigor of the Rambouillet, the rapid rate of growth and milk production of the Hampshire, and the quality and compactness of the Southdown. Is it any wonder then that the lambs which result must be tops? Other crosses are good, too. Delaine ewes bred to Southdown lambs make excellent hot house or spring lambs. And we must not forget the Shropshire, Suffolk, Dorset Horn, Oxford, and Cheviot, all of which cross well with the Southdown.

About the middle of May it was my pleasure to see a flock of black-faced western ewes with lambs sired by Southdown rams. They made a beautiful picture as they grazed contentedly on a field of red clover. Born in January, they were about 4 months old and averaged better than 80 pounds. They were to be marketed the following week. In that flock of one hundred and fifty lambs I saw only two or three that would not grade as tops. Perhaps the owner would have made a little more money had he kept them until they weighed ninety pounds, but that would have been about the upper limit for profitable production.

The best way to learn why Southdown rams are popular is to ask those men who produce market lambs. Let us see what they say:

"The buyers want lambs sired by Southdown rams. They claim that these lambs dress better than others and produce more good to choice carcasses. We might as well produce what the market wants."

"Lambs by Southdown rams look like their sires and have thick, meaty forms. Because the Southdown has been bred for a long time, it is one of the most prepotent sheep and mates well with sheep of most any breeding."

"The Southdown is a good grazing sheep. It does well on most any kind of pasture and the lambs fatten without grain feeding. The most profitable sheep husbandry is based upon the utilization of pastures and for this purpose the Southdown cannot be equalled."

"I have just sold ten yearling rams to be used on grade ewes to make market toppers in lambs next spring. I have no trouble in selling good Southdown rams — they just sell themselves. Too much glory and praise cannot be given a good Southdown ram."

"As a breeder of purebred sheep, I find that lamb producers want Southdown rams and I can sell my Southdown rams for more than my neighbor gets for rams of another breed."

The Southdown of today is a small breed, perhaps too small when it is considered that weight of carcass and weight of wool rather than the highest quality are more profitable. Rams weigh 175 to 225 pounds and ewes 125 to 160 pounds. The head is short, broad, and squarely built, with mouse-colored hair which may range from the light, mealy color to the dark brown. The extremely dark color is not popular. There should be a small amount of wool on the cheeks. Horns or evidence of their presence amount to a disqualification. The ears are short, rounded, and semi-erect, giving an appearance of alertness. The neck is short and thick, blending smoothly into broad, well-meated shoulders. The body is broad, short, and deep, and is covered with thick, firm flesh of excellent quality. The legs are short, refined, and set wide apart. There usually is some wool below the knees and the hocks. The whole body conformation is smooth and rounding with the parts blending more perfectly than in any other sheep.

The skin should be bright pink. It is said by some that sheep with dark skins are not as good feeders as sheep with pink skins. A pale skin, of course, denotes lack of vitality and perhaps the presence of worms. The wool is short and of fine quality, grading mostly three-eights-blood and half-blood. Over a period of 10 years, 52 per cent of the wool produced by the Southdowns in the Iowa State College flock graded three-eighths staple and 26 percent graded three-eighths clothing. Over a period of 20 years, 63 per cent of the wool produced by the Michigan State College Southdown graded three-eighths or half-blood staple and 30 per cent graded three-eighths or half-blood clothing. These records show what can be expected in typical flocks. In weight the fleeces range from five to eight pounds. Again let us look at the college flocks. The ten-year average at the Iowa State College is six pounds, the twenty-year average at the Michigan State College is six and one-quarter pounds, and the twenty-year average at the University of Kentucky is six pounds.

Southdown ewes are fair mothers. Several other breeds rank above them in prolificacy and milk production. Figures compiled by the U. S. Department of Agriculture show that Southdown ewes produce an average lamb crop of 137 per cent. The Michigan College flock averages 144 per cent, while the Kentucky College flock averages 125 per cent. The average Southdown ewe produces about one and one-fourth quarts of milk per day, which is less than half the amount produced by the Dorset Horn ewe. Thus too much Southdown

blood in a flock of ewes for the production of market lambs would not be desirable.

The Southdown has been introduced into practically every sheep country in the world, where lamb and mutton production are important. The leading Southdown section in America is the mid-west and mid-south, with Kentucky leading in number of breeders and number of registered sheep. The American Southdown Breeders' Association, under the direction of its capable secretary, Bill Henning, is doing splendid work in breed promotion and in the development of sheep that are doing so much to improve the quality of market lambs.

Milk Cows for Rent

Condensed from Farm Journal and Farmer's Wife

Short of milk? Rent a cow. That's the way it is at Casa Grande, Arizona, where A. M. Ward, president of the local farm bureau, has started this unusual plan of cow sharing. He furnishes the cow, plus pasturage at the edge of town, for $8 a month. Since one cow gives more milk than one family will need, usually two or three families share the expense and responsibility of milking. Most of the cows are rented to school teachers.

Nine cows are out on this sharing plan, and 23 families are getting their milk direct from the source for from $2 to $3 a month plus a little wrist action. This is a big help, because commercial dairies are having trouble taking care of the demand for more milk. Recently, because of higher feed prices, the rent per cow was raised $2, but the renters paid it gladly rather than give up the plan.

Mr. Ward keeps control of the cows at all times. They graze in his pasture. Persons who milk them walk from their homes and milk the cows, and that is all the connection they have with them. It is strictly a word-of-mouth deal, the town is small, and the people trust their neighbors. If a cow gets sick, or dies, that is Mr. Ward's responsibility.

Reprinted by permission from the Farm Journal and Farmer's Wife, Philadelphia, Pa.

Buck Rakes

Condensed from New England Homestead

Paul B. Hoff

Department of Agriculture, New York State College of Agriculture

BUCK rakes have been used in the hay harvest by mid-western farmers for many years, but only recently have Northeastern farmers become acquainted with the labor saving possibilities of this tool. In New York State alone, nearly 1000 buck rakes were built last year.

The popularity of the buck rake is due to its labor saving possibilities. The number of man hours required to put up a ton of hay with a buck rake is less than the number required by either a hayloader and wagon or a pick-up baler. A smaller hay crew is required, and if necessary, one man operating a buck rake can pick up the load, transport it to the barn and unload it without assistance. Should it not be possible to have help, one man can get in several loads, drop them on the barn floor and mow them away later. The efficiency of a one man crew is higher with a buck rake than with any other method of haying.

The buck rakes that have been constructed by northeastern farmers are mounted on the rear of a heavy car or a truck chassis or on a pair of wheels and pushed ahead of the tractor. The car or truck chassis mounting is the most popular because of fewer construction and mounting problems and because the tractor mounting prevents the tractor from being used for other work. However, using the tractor eliminates the maintenance of another vehicle and motor. The rake cannot be hung on the front of the tractor because the additional weight of the rake and 1,000 pounds or more of hay may severely damage the front tires and the front wheel bearings. The most satisfactory method of tractor mounting is to build the rake on the front axle and wheel assembly of an old car and push it ahead of the tractor. The rake is steered by a drag link from the steering arms which connects the steering arm of the buck rake axle to a suitable attachment on the front axle assembly of the tractor.

The rake may be made of any wood that is tough, straight grained and well seasoned. Many

Reprinted by permission from the New England Homestead, Springfield, Mass., June 12, 1943

rakes have been built of fir, ash or oak and several farmers have reported that they used cedar and experienced very little breakage of the teeth. Teeth twelve feet long are most common, but a few rakes have been built with teeth fourteen feet long. The teeth are commonly 2″x2″ at the outer end and 2″x4″ at the backstop end. Two teeth can be cut from a 2″x6″ by ripping the plank on a taper. Twelve teeth spaced on 11″ centers make a rake 10′4″ wide, which is narrow enough to pass through most farm gates and barn doors.

The hinged hangers for attaching the rake to the chassis for a car mounted rake or to the axle assembly for a tractor rake usually are welded to the chassis or the axle. They should be low enough so that the backstop end of the rake is 6 to 9 inches off the ground when rake is lowered to pick up hay.

Almost as important as the construction of the rake is the construction of the power lift. A few rakes have been made with a hand lift, but they were not very satisfactory. The hand lift is slow, and it is hard to operate while the load of hay is being transported. There is a saving of time if the rake can be lifted to transport position (outer end of the teeth four to five feet off the ground), while it is in motion.

The most satisfactory power lift is one constructed from the rear axle, transmission shaft and gears of a light automobile. Many of the buck rakes built in the northeast last year were equipped with this lift. If the buck rake is attached to a car chassis, the rear axle can be placed across the car frame just back of the operator's seat. The lifting rope is coiled on a drum attached to one end of this axle. The transmission shaft extends forward beside the operator and through the dash, where the transmission gear box is mounted on the car frame beside the motor. The assembly is driven by a V-belt from the motor fan pulley or a second pulley welded to the fan pulley, to a pulley on the front of the transmission gear box. To avoid excessive lifting speed of the buck rake, the transmission must be operated in low or reverse speed.

The power lift is controlled by a lever attached to the brakes. Pulling the lever one way locks the brake on the side opposite that to which the lifting drum is attached, applying the power to the drum and raising the rake. Pulling the lever the other way applies the brake on the same side as the drum and locks the rake when it is raised for transporting the hay. The V-belt, transmission gears and differential run continuously, and the lift is controlled entirely by the

application of one or the other of the two brakes. This arrangement eliminates a belt tightener or clutch to operate the power lift and the control is positive.

The lift for a tractor mounted buck rake is similar, except for the attachment to the tractor. The common practice is to weld or bolt an addition to the rear of the tractor frame to hold the rear axle, and to operate the rear axle lift from the power take-off of the tractor through a universal joint. The transmission shaft is cut off close to the rear axle to allow the lift to be attached close to the rear of the tractor. The lift is controlled by the brakes in the same manner as the power lift on a car chassis.

Operation

The hay should be in the same condition for harvesting with a buck rake as for being picked up with a hayloader. Some buck rake operators prefer a single windrow and others make a double windrow by throwing two windrows together. It is usually impossible to push more than 400 or 500 pounds of hay on the rake, so the usual practice is to double load. As much hay as can be pushed up by the rake is dropped on the ground, then a second load is gathered and dropped on the first. The rake is then pushed under both loads and raised to transport position. Many operators estimate that they load 1,000 pounds or more of hay on the rake by this method.

Slings seem to be the most satisfactory way of getting the hay into the mow. If the barn will not accommodate slings, the four-prong grapple fork is the next best. The hay is too loose for handling with a two-prong harpoon fork.

A comparison of labor requirements of different methods of haymaking is shown in the following table.

Comparative Data on Handling Dry Hay in the Field by Different Methods*

Method	No. of farms in survey	Ave. tons hay per farm	Ave. No. of Men in Crew	Ave. tons per hr. by Crew	Ave. Man hrs. per ton
Wagon and Hay Loader	26	30	3.4	1.1	3.1
Auto Buck Rake	84	41	3.1	1.8	1.7
Tractor Buck Rake	53	35	2.6	1.3	2.0
Pick-Up Baler	23	41	3.2	1.2	2.7

*Adapted from Mimeograph Bulletin No. 146, "A Study of the Newer Hay Harvesting Methods on Ohio Farms," by F. L. Morrison, Department of Rural Economics, Ohio State University, Columbus, Ohio.

Many operators have discovered that their buck rakes are as useful for grain harvest as for hay harvest. One operator reports that his 15-year-old boy operated the buck rake to bring grain bundles to the threshing machine and easily kept the machine busy. Another buck rake owner who does custom combining, uses his rake to bring straw to the baler or to the barn for his customers. A few men have used their buck rakes to bring corn bundles to the ensilage cutter.

Healthy Pullets Are Needed This Year

Condensed from The Rural New-Yorker

Willard C. Thompson

THERE are three great groups, each of which will need tremendous supplies of table eggs and poultry meat throughout this war period, and, for a long time after it is over. (1) The armed forces of this country are eating eggs as never before in history. The numbers in our combined armed forces daily grow and reach into several millions. We shall need to produce billions of fresh shell eggs on American farms in order that this first great need alone may be met. From the standpoint of the American farmer and poultryman, it matters little whether these eggs are used as fresh eggs in shell or as dried eggs, processed somewhere between the farm and the army camp. (2) We are committed, as a nation, to a vast lend-lease program, to a plan under which, along with many other things, great quantities of eggs, and probably some poultry meat, will be furnished to needy peoplies in our allied nations. This lend-lease program, under government agency, will have to buy billions of the products of the American farm and poultry yard this year. Both of these demands upon the supply of eggs and poultry meats are "musts," that is, the poultry industry must produce to meet them. These needs will come as first demands upon whatever eggs and meat the American poultry industry is able to yield this year. The military and lend-lease needs for eggs alone may approximate 14 billions. (3) The American public, made up of the

Reprinted by permission from The Rural New-Yorker, 333 West 30th St., New York, May 29, 1943

vast civilian population which must necessarily stay at home during these war-times and form the home front, as it has been called, must also have its quota of fresh eggs and poultry meats. This need is particularly urgent because of the place eggs and poultry meat must play in relation to other meats and foods used daily.

The poultrymen of this country cannot get away from these three insistent demands for the products of their flocks.

The solution to the egg and poultry meat challenge is undoubtedly to be found in the pullet crop which is now on the road to development, growth and maturity—a job to be accomplished by late Summer and during the Autumn, in order that vast flocks of table egg layers may be at hand for the season which will start in the Fall of '43.

The farm, with fields for use as poultry young stock ranges, is the place where quality pullets can be grown with a minimum of loss and a maximum of sturdy vigor and health. This, of all years, is the time when pullets may well be grown in the open, out of doors, where fresh air, green grass, ample room, and sunshine and shade all are present to enhance and stimulate young stock growth toward maturity. The 1943 poultry range should have these qualities, if at all possible.

This may be accomplished by setting aside for this year's pullet growing use an area, or field, which has not had chickens of any kind for at least two years, so that the soil has been weathered, washed and made sanitary through natural processes. This point is very important, if the farm scheme will permit it, and very frequently a little planning will make this possible. We recommend placing not more than 300 growing chicks on one acre of young stock range.

Division of the young stock should be made on any given field or range into growing units which can be scattered about on the range, and thus made to use it more effectively and efficiently through its whole area. We suggest flocks of about 60 young pullets, or cockerels, for each flock, and for each colony house, or range shelter. If such small growing units are made at the beginning of each rearing lot, and if the units are not bunched together in the field, the tendency of the chicks will be to live together as flocks, move around as such, and use the area immediately about their houses as their own. Special planted ranges are best to furnish essential green foods for the growing young stock and to maintain a sanitary condition on the range throughout the Summer season. The best pullets I saw last Summer were

ranging over a field of ladino clover. The beautiful green growth of the ladino furnished a marvelous source of supplemental feed for the pullets and offered a sanitary range, the equal of which I have rarely seen. Alfalfa, red clover, grass, and other green crops make desirable poultry ranges also. Five colony houses, or range shelters, each carrying 60 youngsters, about equally distributed over an acre of such green-covered fields, with at least 100 feet of space between the houses or shelters is a safe plan to follow.

The New Jersey collapsible range shelter is made in sections, which can be taken down in the Fall, sprayed with a wood preservative paint, and stored away in a dry place over the Winter. In the Spring these parts or sections, as good as new, are taken out to the range and erected on the spot where they are to be used. This shelter is small enough to be handled easily by two men, one on each end. They can be shifted to a new spot on the green field, when the area underneath the roosts has become a bit covered with manure, and the area about the house, out about 30 feet probably is showing wear and the grass is getting worn down. Move the shelter about 75 to 100 feet from the used location. Move the shelters about three times during the growing season as a rule. Each shelter is the Summer home of the pullet flock in it, and should be comfortable and a protection at all times for the chicks.

The shelter must protect the flocks against rain and storms, day or night. The roof must be sturdy, tight, strong and rather thick, and over-hang a bit on all sides. The shelter must be a shade against the noon-day sun, serving in addition to trees and shrubs on the range, for some chicks will always want to stay in the shelters in the day-time. The roof should be painted white, or silver with aluminum paint, if procurable. This will deflect some of the heat rays and make the area underneath more tolerable. The shelter must be airy and cool. It is made on all sides of poultry netting. If netting is not obtainable, then make the sections of laths, with slatted sides to provide airy conditions. The wire-bottom floor further adds to the sanitary character of this shelter, for the manure drops through the meshes, and the pullets do not come into contact with much of it.

Other than the range colony house, or Summer shelter, certain equipment is needed for the proper growing of poultry. A water supply is of paramount importance. Poultry young stock drink a tremendous quantity of water every day during the hot weather. Without a constant sup-

ply of fresh, cool, clean water, chicks will not make as good or continuous growth as is required for ultimate healthy pullet laying stock. The water supply should be furnished to each colony or flock, and be near their shelter or house. Some poultrymen or farmers pipe water to the poultry ranges, laying the pipes along the surface of the ground. This year, unless the piping is already at hand, as it may be in many instances, the piping of running water out to new pullet ranges may be another of those good practices which is out for the duration. The water for young stock on range may have to be carried, in which case a barrel put in a shady place near the shelter, may be the best solution. This barrel is filled occasionally, and the small pans, or fountains, are filled from it. At any rate, provide plenty of water for every pullet flock, if good growth is to be promoted.

Some kind of a range mash hopper is needed for every range flock, and it too must be kept near at hand, to encourage the frequent eating of mash by the young stock. A six-foot long mash hopper for each colony of 60 pullets is necessary. We prefer to use two hoppers, each three feet long. The continuous mash supply is equally as important as the never-failing water supply—one is valueless without the other. A long, low, V-shaped trough, which may be hung up along the outside of the roof during the day-time, makes a good and sanitary piece of equipment in which to feed the scratch morning and evening on range. Some like to scatter this grain on the ground, and that is alright if the soil condition is fairly clean and sanitary. A lock for the shelter door is essential in some places, where it is necessary to shut and lock up the young stock within the shelters late at night, and then release them the first thing in the morning.

In most areas it will pay well to vaccinate the pullets and cockerels each Summer when they are about 3½ months of age, against fowl pox. It is infinitely better to protect them against this disease rather than risk having an outbreak of it just as they start laying in the Fall, as is so apt to occur. At the same handling it may be well to vaccinate against laryngotracheitis, especially if this disease has been prevalent on the farm during this past year. A bit of time and money spent on disease prevention is often a fine insurance policy.

Temporary Pastures for Wartime Production

Condensed from Soil Conservation

Mason Hein

Senior Agronomist, Division of Forage Crops and Diseases, Bureau of Plant Industry, Soils and Agricultural Engineering, Washington, D. C.

TEMPORARY pastures are those used for grazing during a short period, usually not more than one crop season. They are of very diverse kinds to meet regional and climatic demands, and their value for maintaining livestock production has been well demonstrated in the past. During periods of drought, they have been particularly effective and have saved many a fine herd from disaster. The emergency that now exists has nothing to do with drought, but the American farmer has been asked to increase his production of meat and dairy products, and the use of temporary pastures is one of the measures he can take to help him comply with this request. Temporary pastures may be used for all or part of the grazing season and are valuable stabilizers of seasonal production. They may be seeded in early spring, about corn-planting time for mid and late summer use, or in early fall for late fall and early winter grazing. This gives the farmer a wide choice of crops for this purpose. The exact time of seeding and the period of availability for pasture of the various crops used will vary with the regions where used.

A crop that may be grown in practically all regions of the United States, except in the extreme north, is Sudan grass. Sudan grass plantings should be delayed until the soil is warm, which is usually shortly after corn planting time, and planted any time thereafter, depending on the length of the growing season. Under dry-land or semiarid conditions, plantings should be made early, since soil moisture may be lost, resulting in poor germination and uneven stands. Under favorable conditions, this grass is ready for grazing 6 or 8 weeks after seeding, but should not be grazed until it has reached a height of 8 to 12 inches. In Wisconsin, it has been recommended that grazing be delayed until the growth is two or three feet high, because in the less mature growth, or where the plantings have been stunted by heat or drought, some injury to livestock due to Prussic acid poisoning has been sustained

Reprinted by permission from Soil Conservation, Washington, D. C., May, 1943

under their conditions. For maximum returns rotation grazing is recommended, and to prevent injury from trampling, it should not be grazed after heavy rains or irrigation.

The pasture season of Sudan grass varies from 45 to 100 days. Depending particularly upon soil and climatic conditions, Sudan grass has a carrying capacity of two to three animal units per acre. This ideal summer temporary pasture should be used extensively, since seed is cheap and plentiful.

In the extreme North, where Sudan grass is not so well adapted, Japanese millet is a good substitute, or adapted varieties of foxtail millet may be used. The millets make very rapid growth, and can be seeded in late spring or early summer and still produce a satisfactory crop. The foxtail millets are better hay than pasture crops, because of their slow recovery after grazing. Japanese millet, where adapted, will probably be more productive.

Soybeans, an excellent forage for pasture or hay, make a desirable combination with Sudan grass. While such a mixture will not produce a greater yield than soybeans alone, the combination makes an ideal pasture.

In the South, pearl millet is one of the best temporary summer pastures. It makes a very good growth on ordinary soils without fertilizing. It can be planted any time from April to June. In general, the crop is not affected by disease or insect pests, and, for this reason, it may be more productive than Sudan grass, since common Sudan grass is rather severely injured by foliage diseases. The grazing of pearl millet should start when the plants are eight to 10 inches high. When the grazing is delayed, the plants go to seed, and the grazing season is automatically shortened. At Tifton, Georgia, pearl millet has carried better than one animal per acre from early July until mid-September, with gains of almost 150 pounds per acre.

Any of the adapted varieties of annual lespedeza makes ideal temporary pasture during the summer months, in regions where they do well. In Missouri, extensive use is being made of Korean lespedeza as a summer supplemental pasture. The Korean lespedeza is sown in the small grains in the spring, or where it has been seeded previously, it will volunteer under proper management, in the small grain plantings. Spring seedings of grass-legume mixtures in small grain may also furnish some temporary pasture in late summer, without injury to the succeeding year's growth.

For temporary fall pastures, the cereals — rye, wheat, winter barley, and winter oats—are the

most desirable crops, where adapted. They may be seeded alone or in combination with vetch, crimson clover, or bur clover. If planted in late summer or early in the fall, 2 to 5 weeks' grazing may be obtained before winter retards the growth. In the south, the season will be longer, and it is possible, under favorable conditions, to have some grazing during every month in the winter. Rye, because of its winter hardiness and ability to withstand cold, can be seeded over a much longer period than other fall-sown cereal crops. Depending upon the region, fall-sown crops of wheat and rye will provide 2 or 3 weeks' grazing late in April, and then may be allowed to mature for grain harvest. The spring grazing of these winter cereals may benefit the crop where there is excessive straw growth, otherwise yields of grain may be reduced.

In Rhode Island, it was found that winter rye, planted at 10-day intervals from August 10 to September 20, furnished pasture from October 1 to October 25 in the fall, and from May 1 to June 10 in the following year. Wheat under similar conditions was less productive. The rye furnished sufficient grazing to carry two cows per acre in the fall for two weeks and for five weeks in the spring. At Tifton, Ga., Abruzzia rye furnished grazing from February 4 to April 14, while winter-sown oats furnished grazing from February 2 to May 6. The oats gave a slightly higher gain per acre than the rye.

Oats is one of the most palatable and nutritious of the cereals, and will furnish later seasonal grazing than any other cereal. Oats may be seeded in the fall in the south, and seeded earlier than other cereal crops; in the north, spring seeding is best. It does well seeded alone. In some sections, oats and field peas make an ideal combination, particularly on the more fertile soils. For swine or sheep pasture, Dwarf Essex rape may be added to the oats. The oats will supply the early grazing, and the animals will, no doubt, like it better than the rape. The rape will furnish desirable pasturage for midsummer and often until early fall, after the oats has matured or been consumed.

Where adapted, legumes such as alfalfa, sweet-clover, red clover or Korean lespedeza may be seeded at the same time and with the oat crop, or seeded in the spring on a fall-sown cereal crop. The alfalfa and clovers may give some late summer pasturage the first season without injuring the next season's growth.

Italian ryegrass may be used, but it is not so productive on

unfertilized land as oats or rye. Italian or common ryegrass seeded with small grain makes an ideal combination for temporary fall and spring pastures. The ryegrass makes a very good bottom growth, and, at the same time, adds to the production. Ryegrass alone, or in combination with crimson clover, is an ideal fall and spring temporary pasture in the central latitudes on the more fertile soils. Because of its extensive root system, it is also very desirable for soil improvement and conservation purposes.

The Utah Station has recently reported on the use of common rye for temporary or supplemental pasture for their cattle and sheep range land. The planting of rye on sagebrush land depleted of grass cover is proving to be a very desirable practice. The land is plowed with a one-way disk, and, at the same time, 25 to 30 pounds per acre of rye is seeded. The cost of plowing and seeding amounts to approximately $1.25 per acre. The plowing kills approximately 90 percent of the sagebrush, but this material is left in place to protect the land against erosion. This rye pasture will furnish spring grazing for 1 month to 6 weeks, and at a time when the sheep are being moved from the desert range or the cattle from the feed yards or from winter grazing, and is adapted to areas of moderate elevation where the grass cover has been reduced by over-grazing or drought. It also has been found that this type of management has increased the lambing percentage, and the marketed weight of the lambs.

To insure the best returns from these temporary crops, adapted varieties must be used. Foliage diseases, rust, or smuts may severely injure the growth and defeat the whole program. Too much emphasis cannot be placed upon using improved strains or varieties where available.

Striking Reduction of Nematode Infestation

Condensed from Texas Farming and Citriculture

G. H. Godfrey

Plant Pathologist, Valley Experiment Station

ONE of the weak points in the life history of the root-knot nematode, *Heterodera marioni*, is its vulnerability when exposed to high summer temperatures and to drying. All the nematodes contained in the roots of an infested crop, in both egg and larval form, can be killed by exposing the roots to sun heating and drying for only a few hours. Exposure of infested soils to complete sun drying, likewise, is one of the means of eliminating the pest from soils for potting and greenhouse use.

In the summer of 1942 a farm test was conducted to determine if this principle could be applied in the Lower Rio Grande Valley for nematode reduction in vegetable lands. The farm upon which the test was conducted, a 40-acre field belonging to F. N. Vining in Hidalgo County, had a history of damage from nematodes over a period of several years. For example, one field of red beets had been plowed up at a total loss. Beans and tomatoes had always been more or less severely damaged. Occasional cotton crops always showed some nematode root knot (although cotton seems never to be as badly damaged by nematodes here as in some other localities). In the spring of 1942 string beans were severely root-knotted and dwarfed.

Following the harvesting of the beans, the field was given three summer plowings. The first operation, in early June, was a plowing performed in such a way as to turn the beans over, exposing as much as possible of the infested root systems to the sun's heat and drying. The roots were left exposed for several days until they were thoroughly dry and hard. With this operation, probably most of the job of nematode eradication was accomplished, as most of the nematodes associated with the previous crop were still in the roots; and they were eliminated completely. Had they been plowed under, they would have been placed in an environment highly favorable for their survival for several months—sufficient continuous humidity to keep them from drying, and a position where they could readily attack the roots of the next susceptible crop that was planted.

Reprinted by permission from Texas Farming and Citriculture, June, 1943

The second operation was similar to the first—another plowing, with the plow set to turn the soil one and one-half inches deeper. The plowing was done in such a way as to turn the soil over completely, leaving the deepest layer on top of the ground. Mr. Vining did it by setting the disks properly and driving fast with his tractor so that the furrow-slice went all the way over instead of remaining on edge. This operation subjected the nematodes in deeper roots, and those that had already hatched and were free in the soil, to the direct heating and drying effects of the sun. This effect extends to a depth of at least three inches in hot, dry weather. A week or ten days later the operation was repeated, this time one and one-half inches deeper than the last. In this way all but a small proportion of the original nematode population of the soil was killed. The few survivors were left untouched in roots that were too deep in the soil, or as eggs and larvæ deep in the soil.

All three of these plowings were done in 100° weather, so as to get the most out of the drying and heating effects of the sun. The intervals between plowings were determined by the weather, rather than by any set schedule. A five-acre portion, in one corner of the 40-acre field, was left without summer plowing, in order to have a basis for comparison of results. Both treated and non-treated portions of the field were given the usual preparation for a fall tomato crop. The field was planted mostly by transplanting from a seed bed, the roots of the plants showing freedom from nematodes at planting time.

The results of this test were very striking, both in the appearance of the plants and in yields obtained. The untreated portion produced a poor final stand of undersized plants. The stems and branches were small in diameter and length, resulting in reduced fruiting area. The roots were extremely heavily galled, large in diameter and knobby, and about one-fifth as long as on nematode-free plants. In contrast, the plants in the portion of the field receiving the summer plowings were large and vigorous, stems and branches of large diameter, branches long, and fruit production good. Roots were long and slender. Such root galls as were to be seen were mostly on small branch rootlets and not sufficiently abundant to do any measurable damage.

The differences in yield constituted the most striking part of the test.

GROSS RETURNS FOR TOMATOES

Untreated	$146 per acre
Plowed twice	250 per acre
Plowed three times.	266 per acre

Considering the portion of the field plowed three times, there was an increase in gross returns of $120 per acre, which can probably be attributed almost entirely to nematode control. The cost of the three extra plowings was not over $7.50, or possibly $9 per acre. This would still leave a profit of $111 per acre over the returns on the non-treated portion. The five-acre portion receiving only two summer plowings grossed $104 per acre over the non-treated. Deducting $6 for costs of plowing, there still remained a gross-return profit of $98 per acre. The greatest returns from the summer plowing, therefore, would seem to have accrued from the first two plowings. The gross-return profit from the third plowing was $13 per acre. The apparent benefits were so great that they cannot be ignored as being due to chance.

A possible criticism of this method of nematode reduction may lie in the belief of damage to the productivity of the land by burning out the organic matter in the soil during the summer-fallow period. This belief is probably justified by fact when the summer fallowing is overdone. By limiting the number of plowings to two or three the damage would not be excessive. Another means by which this objection could be overcome would be by doing the plowing earlier in the year than July, and following with a good green-manuring crop. As soon as the spring tomato season is over (or beans or other nematode infested crop) the series of summer plowings described herein can be given, and then cane or some other nematode-immune crop can be planted. It has been repeatedly demonstrated that when such a crop is plowed under in August, and nitrogen added to hasten its decay, the land will be in excellent condition for the planting of a fall crop.

The interference of rainfall with the complete drying of upturned roots and top layers of soil is a possibility. Rainfall, too, may wash nematode infestation more deeply into the soil. In the event of summer showers in the drying period, it may be necessary to leave the exposed roots for a longer period, awaiting dry weather, and to govern further operations accordingly. It might be well to give an additional final plowing to throw up a still deeper layer of soil for the benefit to be derived from sun heating and drying.

Recommendations

(1) Plow up a badly nematode-infested spring crop in such a way as to expose the roots to sun heating and drying.

(2) After a week or ten days plow again one and one-half or two inches deeper.

(3) Give a third plowing a week or two later, still deeper.
(4) Govern the timing of all plowings by the weather; the higher the temperature and the lower the humidity, the more rapidly will the nematodes be killed.
(5) In the event of rains, delay plowings until the drying effect of a period of sunshine has been obtained on the top soil.
(6) Whenever feasible, follow the drying period with the planting of a green-manure crop, which is to be plowed under, with added nitrogen and perhaps superphosphate, at least once a month before time for planting a fall crop. Plenty of moisture, supplied by irrigation if necessary, should be present to aid in the decomposition of the organic matter.

Better Cattle Feed

Work done by W. A. Albrecht at Missouri College of Agriculture has shown that forage and other feed grown on fertile land has a higher feeding value than that produced on soil deficient in some of the fertility elements. It seems certain that livestock find feed from fertile soil more palatable. Ludwig Brothers, of Winneshiek county, Iowa, limed a part of a pasture and applied 200 pounds an acre of 20 per cent phosphate. When 16 yearlings were turned into the field they walked across the unfertilized area to graze on ground that had been treated.

The Ludwigs learned it was possible to disk up permanent pasture to work in lime and phosphate and make a seedbed for legumes without destroying the grass stand.

Bluegrass cut up with a disk soon was thicker and more vigorous than that which had not been worked. On treated ground it grew rank and leafy, was dark green in color and soon smothered out weeds. The treatment was still effective after 4 years and the Ludwigs believed that the portion limed and fertilized was 4 times as productive as an untreated acre.

—*Capper's Farmer*

The Weather Man

Condensed from Missouri Ruralist

SORELY missed by farm people everywhere have been the weather forecasts formerly issued by the U. S. Weather Bureau. Farming operations before the war were keyed to the "long-distance" predictions of the weather man, who despite all the fun poked at him is pretty reliable.

No other group uses, and needs, weather information more than farmers. Haying, harvesting, planting and a hundred other operations, all can be better planned when the coming weather is known.

But as soon as war came to this nation, weather predictions were limited to 26 hours in advance. This has worked a hardship on farmers who had learned to depend on their friend, the weather man.

Reasons why weather information is a military secret are fairly obvious. Most of us think of it in connection with planning a bombing raid, but a far more practical use to the enemy would be knowledge of weather conditions along the coasts. By following the progress of storms and other weather across the continent, enemy submarines would know when to attack ships, when ships would likely be leaving, and when to surface for charging their batteries.

But while farm people have chafed at the regulations that have deprived them of a useful service, the Weather Bureau has recognized the need for help on the farm in planning operations. Special bulletins have been radioed when unusual storms have approached that would endanger livestock. The limited forecasts have been of value.

But now comes the biggest step since war began—a new service presented by the Weather Bureau co-operating with the Agricultural Extension Service. Called operational advice, the new service which is flashed by radio daily suggests farming operations in season and what may be accomplished.

The advices do not mention the weather—but you don't need any special "insight" to figure out from the advices what to expect in a general way from the skies.

A good example of the "flashes" would read, "Hay will cure slowly and some working over will be necessary locally. Hence, not advisable to have much hay down." Obviously, local showers are expected.

Reprinted by permission from the Missouri Ruralist, June 26, 1943

Everyone is fond of saying that the weather forecaster is never right, but we all know better than that. Predicting coming weather is an exact science nowadays, with the aid of innumerable devices that measure this and that, with modern communications putting weather conditions of the entire nation at the observer's fingertips.

In towns throughout the nation are volunteer weather observers making their daily reports. There are stations throughout the world making reports to central stations, which in turn pass the information on from other smaller stations. From lonely vigils on mountain tops, on desert islands, and from ships at sea comes a stream of weather information, all helping the weather man tell you not to cut your hay or it'll get a wetting.

Until just a few years ago man could only observe the weather on the earth's surface, but now the sky is the limit. Conditions at 5,000 and 10,000 feet up, even 50,000 feet bring about the weather conditions that occur at the surface. Kites, then airplanes, have been used to probe the secrets of upper air currents and their effect on weather.

Now helium-filled balloons are used to bring back the secrets of the skies. These balloons are equipped with instruments known as radiosondes, which send out signals denoting pressure, temperature and humidity at frequent intervals during ascent. Automatic receivers on the ground record the radio signals and from this record meteorologists plot the conditions at varying altitudes.

The weather man at his office has a maze of instruments at his command to tell him every known factor about the weather—except exactly what it's going to be. For although surrounded with instruments and equipped with knowledge of conditions throughout the world, the weather man can't always call his shots correctly.

Statistics show that up to 12 hours in advance the forecaster is right about 95 per cent of the time. At the end of 24 hours he hits it about 85 to 90 per cent; and at the end of 36 hours he does well to make his predictions 80 to 85 per cent accurate. Of course, we always remember the hay that was ruined and the tomatoes that froze.

The weather men have their "rules" as to what the weather should do—but it doesn't always follow these rules. They study the movements of low-pressure areas and high-pressure areas and fronts, and then can come pretty close, for they know what to expect from the conditions.

Just recently a trained meteorologist remarked that if you

could take all the weather man's instruments away from him he couldn't even begin to match the farmer in making weather predictions. He indicated that a farmer can do a pretty good job of predicting weather.

This was interesting! Can a farmer with a knack at observation predict coming weather? With just a couple of simple instruments, can he combine their readings with watching the weather about him to reach fairly accurate forecasts?

Our friend, the meteorologist, thought so. He suggested the use of some kind of barometer and a simple thermometer. To supplement these instruments he suggested a close study of the skies, to watch both clouds and wind directions.

A simple barometer filled with colored water and costing 25 cents was obtained. Tacked on the wall it has given a fairly accurate reading of rising and falling atmospheric pressure. And it is the changing of pressure we want to watch; the reading itself doesn't mean a thing. A barometer naturally makes a few little changes during the day at different times, but the approach of low- and high-pressure areas are recorded by sharply rising or sharply falling barometer. The simple little barometer purchased works just backwards from the usual barometer. When the pressure is rising this barometer falls, and does just the reverse when pressure is falling.

It is because of the farmer's close contact with clouds and wind that he is often a skilled weather observer. He deals with weather so much.

Of course, clouds are never just alike, but they fall into fairly general patterns. The best-known clouds are probably the big, billowy, cumulus clouds that form on about every pretty day in summer. These clouds are formed by rising warm air, usually air warmed by the heat of the sun on the earth's surface. If there is lots of moisture in the air and these rising clouds strike cooler air above, there may be local thunder showers.

Then there are the cirrus clouds, which are the highest clouds. They are very feathery and light. They are from 5 to 6 miles high. There are all kinds of clouds in between, also cumulus which look like a flock of sheep marching across the sky, strato cumulus which often travel in great "trains," and many others.

Wind movements indicate low- and high-pressure movements. Winds move counter-clockwise about a low-pressure area. Low-pressure areas usually bring on our rains and storms. Most of us have observed that a wind in from the east brings rain—and that's why. The wind moving

counter-clockwise around a low-pressure area indicates that when the wind blows from the east that the low is to the south and west. That means rain as a rule.

Winds blow clockwise around a high-pressure area. This usually means good weather.

The old signs often have very sound background of weather science. Grandfather always said that when you saw clouds moving to the north, look out — they come back with rain. Clouds moving to the north do indicate the approach of a low-pressure area and unsettled weather.

Another sign was that if there were no clouds in the sky early in the morning of a summer day it would rain. Maybe we can explain that one. With no clouds on a hot day the sun is going to heat the earth pretty hot, causing more formation of cumulus than normal. Real heavy cumulus often leads to showers.

We've all heard that thunder showers follow the course of rivers. Meteorologists say they more correctly form on rivers, as the sun striking the water of the river causes the air above to be more moist, forming heavy cumulus and bringing rain.

How can we foresee the approach of a low-pressure area? The barometer will tell us, and watching the clouds will help. First, the very high cirrus will start moving in, usually from the southwest. When it starts moving across the sky in great trains we may guess it's following a high-pressure area and a low is on the way. Then lower clouds will begin to sweep in, perhaps in "trains."

Then the heavy cumulus will appear, perhaps looking real dark with moisture. Then you had better head for the barn with the load of hay.

A discussion of weather observing would not be complete without mention of the young army of meteorologists in training in our armed services. Military operations, especially on the sea and in the air, must be geared to weather conditions. And our army has the best trained forecasters in the world.

Grass Silage

Condensed from The Jersey Bulletin

C. B. Bender

New Jersey Agricultural Experiment Station

MORE milk is needed than was produced last year and the production of this vital food must be increased in spite of real shortages in both total feed supplies and high protein concentrates.

In order to combat and overcome these problems our dairymen must pay careful attention to the production and harvesting of high quality roughage.

The number one roughage is the hay crop. This preferably should be a legume such as alfalfa or the clovers, or mixtures of legumes and grasses.

If cows are fed all the good legume or mixed hay they can consume, then milk production can be maintained at a maximum by supplementing this hay with the present reduced protein grain rations. However, if the hay is of poor quality, milk production will decrease.

Farmers in the northeast, and in fact throughout most of the milk producing areas of the country, cannot make high quality hay out of all of their hay crops because of adverse weather conditions. Rain, the most beneficial factor for the growth of the hay crop, is also the greatest curse at the time of hay making. It can cause the loss of from 15 to 100 per cent of the feeding value of the crop. Feeding hay, that has lost 20-40 per cent of its nutritive value, supplemented with the present grain rations to milking cows, will reduce the production of milk. Here is where legume or grass silage become of greatest importance.

It is known from past experience that the first cuttings of legumes are coarse, woody, and not very leafy because they are cut when they are too mature. The cutting has been delayed usually because of rains which occur when the crop should have been harvested. Harvesting this first cutting and putting it into the silo for winter feeding is the best answer. This not only insures a feed of high nutritive quality but research has shown

Reprinted by permission from The Jersey Bulletin, Indianapolis, Indiana, June 5, 1948

that this silage because of its high carotene content improves the quality of the milk, keeps the cow in better breeding health, and develops stronger calves.

Corn silage does not have these advantages, the carotene content is low and the protein content is lower by about 50 per cent.

Under normal conditions the answer seems simple. Ensiling the first cutting legumes with molasses, which preserves the green material as silage and increases its nutritive value, plus hay made from the second and third cuttings insures the herds of an ample supply of high quality roughage to meet the production goals. However, conditions are not normal. Molasses, usually the cheapest preservative, has also gone to war in another form. It is being made into alcohol for explosives. A small tonnage may be available for silage making but it will be far from ample.

Luckily, research has kept ahead of this problem. Cereal grains such as ground corn, wheat, barley, oats or combinations of them will take the place of the molasses and do an excellent job of preserving these green crops as silage. At the same time they also increase the protein content of the silage as well as the total nutrient content. These grains may be added by means of a hopper, gravity delivery to the green material as it goes through the throat of the ensilage cutter. The hopper is built of wood, making a container of sufficient size so that when filled with grain, it will have sufficient capacity for one-half or one load of green material. At the bottom of the hopper a sliding panel controls the flow of grain. Needless to say, sufficient clearance must be allowed so that there is no interference with the green hay coming over the table. The hopper should be braced against the ensilage cutter so that the vibration of the machine will enhance the flow of grain. As the top of the hopper is some distance from the ground, a platform or an inclined runway will reduce the labor of keeping it filled.

Soybeans need 250-300 pounds of ground grain per ton of green weight; alfalfa or clover needs 200-250 pounds depending on the moisture content of the crop, the higher the moisture the more grain. Mixtures of grasses and legumes 150 - 200 pounds, and straight grasses 100-150 pounds. Chopped field cured hay may also be used as a preservative at the rate of 300 pounds per ton of green material. Even chopped dry corn stalks will do the job but in this case the protein and total nutrient content of the silage is reduced.

Grass silage can also be made without the addition of a preservative if the green crop is

wilted to 65-68% moisture. This method needs very careful control in the field and at the silo, to prevent spoilage. The theory back of this method is that by reducing the moisture content of the crop the sugar percentage on a dry matter basis is increased and as a consequence the material is satisfactorily preserved. In using this method, rapid filling of the silo must be the watchword, otherwise excessive heating will result. There is also a tendency for molds to form in the silage unless the air is driven out rapidly by the pressures developed within the silo. When high temperatures develop there is a loss of nutrients in the silage by oxidation. The combination of wilting and high temperatures always brings about a heavy loss in the carotene content of the silage, which, of course, reduces the carotene and vitamin A content in the milk of cows fed this material.

The ensiling of hay crops involves the operations of cutting, gathering, hauling, chopping and elevating the material. These operations are common to hay making and corn silage. As a consequence no new type equipment is needed on the average dairy farm. That, however, does not mean there is not a need for new machinery in these operations. Experimental work with green hay harvesters and heavy duty loaders has demonstrated greater efficiency with subsequent lower costs and less trouble by using them.

The crop is usually cut with a horse drawn mower or one attached to the tractor. A tractor mower cutting a six-foot swath will keep two or three trucks and a loader busy. In planning operations, sufficient time should be allowed for mower repairs when working on stoney land. The mower operator should see that the knife is cutting clean and that the grass stick on the cutter bar has the proper angle. These points will help in placing the swath properly and avoid loading troubles. Vine lifter guards can be used to advantage in cutting lodged crops.

Raker bar or double-cylinder loaders can be used to pick up the material from either swath or windrow. When gathering material from the swath, loaders have a tendency to borrow from the adjacent swath when these swaths are not well placed. This causes clogging of the machine, especially on hillsides and on turns. There is also a tendency for long grass to wrap around the raking cylinder. Care and closer field inspection with immediate correction will prevent delays and damage from these causes.

Hauling may be done with trucks, trailers or wagons. On long hauls trucks are preferred. With dump trucks, continuous

operations are possible with fewer vehicles.

For short hauls where small trucks are used it is possible to operate without a man on the load. When the material has accumulated at the rear of the truck a sudden stop will topple the load forward. Loading may then be completed. Most dairymen prefer to have a man on the load and build from the front to the back of the wagon or truck. Care in building the load will make the work of unloading at the cutter somewhat easier.

Most of the ensilage cutters are equipped to handle green crops in a satisfactory manner. The cutter knives should be sharp and close clearance for both paddles and knives is essential when working with grass silage. When running high moisture material through the chopper the cut may be set at ¾ inch. For partially wilted material the cut should be set at ¼ inch so that it will pack better in the silo.

The preservatives may be applied in several ways. Molasses may be applied at the throat of the chopper by gravity or pump. It may also be applied in the fly wheel housing by pump. Phosphoric acid is applied by gravity at the throat of the chopper. The grains are usually fed by gravity from a hopper placed above the cutter table.

In filling the silo the material should be leveled off after each load until the silo is half full. From then on it is advisable to have someone in the silo. This man should thoroughly tramp the silage around the silo wall and have the silage higher in the center of the silo than at the walls. This becomes progressively more important when the filling is near completion. When the silo has been filled, allowed to settle, and then refilled, the top should be tramped for a couple of hours daily for five or six days. The top may then be wet down for about three hours and the sealing is completed. Some farmers use an added safeguard—they cover the thoroughly tramped material with tar paper and then blow up sawdust or any green material to a depth of six inches.

The reason for keeping the green material high in the center of the silo is because this is the point of rapid settling. If the silage were level at the completion of filling, rapid settling in the center would pull the silage away from the walls at the top of the silo, causing excessive spoilage. With it high in the center, settling would cause it to act as a wedge, pressing the material firmly against the wall. These safeguards are more important today when we need to eliminate all waste.

In all grass silage operations low ensilage costs are associated with higher yields. Cost studies

at the New Jersey Agricultural Experiment Station show that the range was from $1.66 a ton for a 10-ton per acre yield to $2.22 a ton for a 6-ton yield. Considering all costs, per ton of silage showed that grass silage was delivered into the silo at $4.71 a ton while corn silage cost $6.57. The greatest difference in costs between the two crops lay in their production. Corn is an annual while legume or legume and grass combinations are perennials.

Good grass silage produced from a crop that would have made excellent hay and that has been properly preserved, has a clean silage odor, is slightly acid to the taste, and may vary in color from green to brown. The cows will eat it readily and produce well on it after they become accustomed to it. The main point to remember is that changing to grass silage feeding should be done gradually rather than abruptly.

Grass silage may be made from any legume, grass, or cereal crop. In the form of silage, as in the form of green feed or cured hay, different crops have different physiological effects and different feeding values.

Large amounts of alfalfa silage fed to cattle will prove laxative if the change in feeding practice is made too abruptly. The same condition would result if the cattle were turned out on alfalfa pasture for the first time. The laxative condition is the result of improper feeding management. In making the adjustment in the feeding of any grass silage, hay is the balance wheel. Feed the silage in small amounts and the hay more freely. Then gradually increase the silage and reduce the hay. This will minimize the laxative effect.

By the same token, some silages seem to be more constipating than others. This is true especially when a grass hay, such as timothy, is fed with a cereal silage. This difficulty is readily overcome by feeding additional salt, which causes the cows to drink more water.

When legume silage is fed to replace corn silage, the protein content of the grain ration may be reduced to 12 per cent. When timothy or cereal silages are fed, their protein content is a little higher than that of corn silage and their nutrient content is slightly lower. A 16 per cent protein grain ration is satisfactory to feed under these conditions.

When the silo is opened for feeding, a forkful of grass silage weighs less than a forkful of corn silage. After 10 feet of the silage has been fed out, a forkful will weigh about the same as an equal quantity of corn silage. The last 10 feet of grass silage in a silo will weigh considerably more than corn silage. This accounts

for the statement, made by many men who feed grass silage for the first time, that grass silage does not have the same feeding value as corn. Another point to be remembered is that grass silage, because it is ensiled at a stage of growth comparable to the milk stage of corn, has a total digestible nutrient value equivalent to corn at the stage of maturity. Corn is usually ensiled when it is more mature than grass silage, consequently it has a slightly higher nutrient value. This is overcome by feeding more grass silage to make up for the difference in nutrients.

As a standard practice, grass silage should not be fed to replace all of the roughage in a cow's diet. Any such substitution should be only an expedient. Grass silage may be fed to replace all of the corn silage or all of the corn silage and part of the hay. Hay should not be reduced, however, below a minimum of six pounds a day.

A 1,000-pound cow may be fed 40 to 60 pounds of grass silage a day. In addition, she should receive all of the hay she will eat. Translated in other terms to include the larger or smaller breeds, four to six pounds of silage may be fed for each 100 pounds of cow. This means a 1,500-pound cow would receive from 60 to 90 pounds of silage a day, and an 800-pound Jersey would be fed 32 to 48 pounds. This shows the leeway possible in feeding grass silage. Some large cows in the herd at the Dairy Research Farm at Sussex, N. J., have consumed over 100 pounds of this silage a day. Any reduction in the amount of silage fed should be compensated by an increase in hay.

Continuous feeding trials for a period of two years comparing grass silage to corn silage showed that the molasses silage group averaged a production of 29.4 pounds of 4.0 per cent fat corrected milk on a ratio of 1.4 pounds of milk per pound of nutrients consumed, while the corn silage groups averaging 30.1 pounds of milk on a ration of 1.45 pounds of milk per pound of nutrients. From these experiments it is concluded that grass silage, having a content of 60 per cent legumes, is equal in production value to a corn silage ration calculated on a nutrient basis. Furthermore, according to our silage cost figures the cost of this milk production is lower for the grass silage groups.

From many years of feeding grass silage we have found that it is an excellent feed for yearling heifers. In fact, this is the time to get them accustomed to heavy intakes of the feed. On a diet of good quality grass silage made from a mixture of legumes and grasses fed ad libitum, plus a minimum of four pounds of hay,

it is possible to get weight gains of one pound a day without feeding grain. However another point should be made, it is also possible to get weight gains of .2 of a pound a day by feeding silage of an inferior quality made from quite mature grasses. There is as much difference in the nutritive value of the grass silage as there is in hay made from the same quality materials. Heifers accustomed to eating large quantities of grass silage will eat large quantities of it when they come into production. If heifers are roughed over on corn silage and then are given grass silage when they reach the milking string, their intake of grass silage is never as high. Habit plays quite a role in roughage consumption.

When milking cows are fed high levels of grass silage and hay their milk is very definitely of better flavor than is the milk produced on corn silage and hay. This has been proven both on raw and pasteurized milk. Furthermore the flavor holds up better in storage. This protection against oxidized flavor is extremely valuable.

The color of milk produced on high levels of grass silage feeding can be maintained at approximately a spring pasture color level in the winter months, without the hazards of the grass or garlic flavors. Holstein cows fed heavy intakes of grass silage and hay will produce a more yellow colored milk in the winter than Guernsey cows fed corn silage and hay. A large percentage of this yellow color in the milk is carotene or pro Vitamin A. This vitamin is of nutritional importance, especially to children. It is of more importance this year with rationing of butter.

Grass silage is more important this year than ever before. High quality roughage (grass silage and hay) controls 70 per cent of the productivity of the cow. Mixed legume or legume silage and a legume hay supplemented with a 12-14 per cent grain ration will maintain the milking herd at peak economical production and eliminate the worry in regard to shortages of high protein concentrates.

Farm Garden Irrigation

Condensed from Electricity on the Farm

I. P. Blauser

Agricultural Engineer, Ohio State University, Columbus, Ohio

FARM gardens as well as Victory Gardens are very important. Their successes or failures are sure to have considerable effect upon how well people on the home front eat this year. Much of our regular production will be needed for our armed forces, our allies, and for the devastated countries.

Even in peace time, farm gardens, if carefully planned and properly cared for, have generally been a worthwhile investment of time and labor. Too frequently, however, farm gardens produce only fair results, or are almost complete failures because of insufficient rainfall or uneven distribution. There are very few years when both the quantity and distribution of rainfall is such that supplemental water will not increase total production or improve quality. Commercial vegetable growers know the importance of irrigation and consider the investment in equipment, even though not used fully every year, an insurance against crop failure due to lack of moisture at the right time.

Irrigation for the farm garden is just as important as it is for commercial production if best results are to be secured. These gardens require seed, fertilizer, and labor, which may not be profitable or satisfactory expenditures unless provision is made for irrigation. Plans to supply supplemental water should be worked out well in advance of the time when it may be needed, because once the crop is suffering from lack of moisture irreparable damage may be done before water can be applied. Many farms already have equipment on hand, or can easily assemble materials needed to do a satisfactory job of garden irrigation. If equipment must be purchased, it should be secured early, for even though irrigation pumps and equipment are not rationed at the present time, purchase certificates are required for some of the equipment.

Irrigate Before Crop Suffers

To be effective, irrigation must be adequate, applied properly, and the soil must be fertile. Irri-

Reprinted by permission from Electricity on the Farm, New York City, June, 1943

gation to be most successful must be applied before the crop is suffering from the lack of moisture. The two general types of irrigation that may be used for gardens are overhead irrigation and surface irrigation. The overhead irrigation may be with an overhead pipe with fixed spray nozzles generally known as the Skinner system, or by revolving sprinklers. Surface irrigation may be by furrows if the surface is level enough or the planting done on contours, or by porous canvas hose. Furrow irrigation where it can be used will probably be the most economical. Overhead irrigation more nearly resembles rainfall, and can be used any place regardless of the slope. The type of system to be used will be determined by the conditions, and also by the equipment already on hand or which can be readily secured. Every effort should be made to use equipment already on the farm such as hose, sprinklers, used pipe, and even V-shaped wooden troughs made by nailing two boards together.

Probably the most important things to keep in mind about irrigation are the rate of application and the total amount of water to apply. Most gardens that are primarily for family consumption will be from one-fifth to one-tenth acre in size. For optimum vegetable growth, the soil should receive one inch of water per week either from rainfall or irrigation, separately or combined. An inch of water over an acre is approximately 27,000 gallons, which would be 5,400 gallons per one-fifth acre and 2,700 gallons for a one-tenth-acre garden. The water should be applied no faster than it soaks into the soil, and that is true regardless of the method of application. To apply water faster than the soil will take it will not only waste water, but will puddle the soil and waste plant food as well. If furrow irrigation is used, extra care must be taken to see that water is supplied in large enough quantities so that water travels the full length of the furrow, and does not sink away in one or two spots.

Most farm water systems that would be used for garden irrigation have a capacity of from 250 to 500 gallons per hour. Since the water system also furnishes the water for the other farm and home needs, the full capacity of the pump can not be used for irrigation purposes, unless it is done at a time when there are no other demands. A 500-gallon per hour pump, if used entirely for irrigation, would supply an inch of water to one-tenth acre in about 5½ hours, or one inch to one-fifth acre in about 11 hours. If only 300 gallons per hour are available for irrigation, then 9 hours and 18 hours would be required to supply an inch of water

to one-tenth and one-fifth acres respectively.

For overhead irrigation, about 3½ to 4 gallons of water per minute at 30 to 40 pounds pressure per square inch are required for each 50 feet of pipe. The width covered is from 50 to 60 feet wide. The length of the pipe must be matched with the capacity of the pump, and then moved from place to place to give complete coverage. A garden 85 ft. by 100 ft. is approximately one-fifth of an acre. An overhead pipe line 85 ft. long requiring between 6 and 7 gallons per minute or 360 to 420 gallons per hour would cover half of this size garden at a time.

Rotary sprinklers are available which require 150 gallons per hour or less, and give coverage up to 60 feet or more in diameter. Here again, it is necessary to keep moving the sprinkler until the entire garden is covered. Ordinary rotary lawn sprinklers may be used with fair success, especially if placed on a pipe standard 2½ to 3 feet high.

In furrow irrigation, the water should be applied in narrow furrows in quantities such that some water moves the full length of the furrows, but not more than the soil will take up. Wooden troughs may be quite useful in carrying water to the garden from the pump. A slight, uniform slope is desirable for surface irrigation. More care is generally required for surface irrigation, if the water is to be uniformly distributed, unless the conditions and soil are ideal for that type of irrigation.

Another thing that needs to be checked before plans are completed, is the water supply. Be sure that the available supply is sufficient to meet the needs. Some gardens may be located at some distance from the pump; if so, check to see that the pipe size is large enough to prevent excessive loss of pressure.

Since the capacities of farm systems are not large, it may require considerable time to cover the entire garden. Remember one heavy application is much better than a number of light ones, even though the total amount of water put on the garden is the same in each case.

The Developing Chick Becomes a Laboratory

Condensed from American Poultry Journal

Lois A. Snyder

DIVERSION of the embryo chick into a laboratory finale for propagating certain animal disease viruses, has provided an effective weapon in fighting baffling livestock plagues. The discovery was made within recent years at Vanderbilt University and greatly enlarged upon by scientists in the Federal Bureau of Animal Industry.

These experts explain that not all animal disease agents may be advanced in the rudimentary chick, but the incubating egg is susceptible to a large number of viruses. Already the developing embryos are employed in making vaccines for such maladies as pox of birds, sleeping sickness in horses, and laryngotracheitis in poultry. Preliminary research also promises results in establishing protection against swine and horse influenza, vesicular stomatitis, dog and cat distemper, rabies and pseudo rabies.

Formerly, livestock immunity was accomplished in much the same manner as human protection, through vaccine inoculations. The vaccines, in turn, were prepared by injecting the offending virus into the body or blood of laboratory animals to bring about multiplied quantities. Frequent death of the specimen-patients rendered this arrangement somewhat expensive, and the vaccine derived was likely to vary considerably in strength and quantity. An added disadvantage was the ever-present possibility of contamination.

In direct contrast to former processes, the recently-developed method provides vaccine at lowered cost, at the same time supplying a more effective immunity. The virus may be passed from one egg to another, thereby increasing the amount of the infective agent as often as desired.

The sterile abode of the incubating egg offers a two-way protection against inner and outside contamination. Secure within a sanitary shell, the embryo chick progresses healthily, and until pipping time, remains reasonably safe from the various ailments that may materialize upon hatching. Likewise, the small shell renders the unborn chick an ideal host to the virus, as there is no probability of outside pollution.

The mechanics of the process are relatively simple. The egg is

Reprinted by permission from the American Poultry Journal, Chicago, Illinois

allowed to remain in an incubator for 9 to 11 days, after which time it is removed for the virus injection. Since introduction of the virus is more satisfactory when made, not only in the air cell, but at center of the egg, it is necessary to move the normal air space from the end to the middle.

Using a small drill like that employed by dentists, the shell is opened first at the air cell in the large end of the egg. The inner white membrane is punctured with an electrically heated wire to prevent infection; a similar opening is made in the center. When the middle perforation is turned upward, the air is forced away from the end, and the normal space is shifted toward and under the hole at the center. A hypodermic needle then injects the virus into this transposed air cell, after which the egg-shell about the opening is painted with iodine and both apertures are closed with sealing wax.

The virus proceeds to "grow" until the embryo is killed or develops characteristic lesions true to particular type. An 11-day-old chick embryo usually dies approximately 16 hours following inoculation. It is possible to measure the amount of virus which has "grown" during that period; not infrequently, an incubated egg may develop as much as 5,000,000 or more minimal lethal doses per gram of weight, a quantity sufficient to destroy an equal number of guinea pigs.

Further treatment must follow before administration as a vaccine, otherwise the inoculated animal would incur the disease in its original intensity. Each virus has an anti-infective quality which is offset by an infective attribute in much greater proportion. When treated with formalin in a saline solution, the infective element is destroyed, leaving the anti-infective property known as antigen. Inoculation with antigen accomplishes immunity for periods of time that vary in different diseases. In the case of sleeping sickness (encephalomyelitis), protection remains for at least one season.

In view of the progress made, farmers and stock raisers are thoroughly justified in their optimistic outlook toward the final conquering of major animal maladies.

More Pigs Saved If Farrowed in One-Litter House

Condensed from Hog Breeder

At least seven pigs a litter can be raised for wartime pork if sanitation precautions are reasonably complete in using small, one-litter field houses for farrowing quarters instead of the old-type central hog house, according to E. T. Robbins, livestock extension specialist, University of Illinois College of Agriculture. The average for Illinois is about six pigs saved from spring litters.

So successful is the small-house system that more and more farmers are adopting it and turning their central houses into shelter for machines, calves or chickens, Robbins reported.

The "Illinois war winner hog house" developed by Robbins and D. G. Carter, of the college's department of agricultural engineering, is being hailed as the last word in small, one-litter type of field houses.

One method with the small field houses is to scrub all of them early, then scatter them two rods apart in a field where no hogs have been for a year. The houses and ground beneath them should have a full week or longer to dry. Then the houses should be half filled with straw.

About a week before the first litters are due, all sows should be washed (on a mild day) and turned into the field. They may be fed together in one place before and after farrowing, depending upon the sows' instinct to guide their nesting, eating and drinking habits.

On some farms using these scattered houses, sows are separated by electric fence, allowing about eight to the acre.

Another method is to line the little houses in a solid row and separate litters by low panels of fencing while pigs are small. Men who follow this plan have more work to do and usually have to contend with mud in the lot, which is perhaps 6 by 12 feet, in which the sow and litter are confined for a week or two.

It is becoming more and more common not to shut the sow in the house at any time, since the nest keeps clean and much drier if she is free to move about. Dry bedding is essential for little pigs in cold weather.

Reprinted by permission from the Hog Breeder, Chicago, Illinois, March, 1943

Viruses, Bacteria and Fungi

Condensed from The Farmer's Advocate

Dr. John Dearness

KNOWLEDGE of the chemistry of materials, and skill in the methods of preparing and employing them are at the basis of effective and economical use of fungicides and insecticides; some knowledge of two other sciences — mycology, the science of fungi, and entomology, the science of insects—is involved in completing successful treatment. The Bordeaux chemists—Millardet and Gayon — initiated effective spraying of the very destructive mildew of the grape with their lime-copper-sulphate mixture.

The rapid eastward migration of the Colorado beetle turned potato growers' attention everywhere to means of poisoning the invaders. Their arrival in Ontario is recorded as July, 1870. Many farmers can recall carrying along the rows of potatoes a pail of water poisoned with Paris green or London purple and whisking it on the leaves which were rapidly being devoured. The need of greater efficiency and saving of labour in defending various crops and orchard trees against insects brought a variety of pumps and agitating devices into the market, but effective spraying awaited the invention of the mist-making nozzle.

In this review of spraying it is interesting to note that in 1883, the late Dr. W. Saunders, the highest authority on orchard insects at the time, in a 400-page treatise on injurious fruit insects rated the codling moth as one of the most troublesome insects with which fruit growers have to contend. He said the best remedy is banding the tree with old rags in or under which the mature larvae will pupate and over-winter. Thus entrapped they can be destroyed. The two other remedies—hanging bottles of sweetened water in the trees to catch the moths and attracting them at night to lighted fires—he did not consider important. Without expressing an opinion he mentions the report that syringing the trees with Paris green and water "will deter the moths from placing their eggs on the apples." Today as soon as the petals have fallen the empty flower-cup is given the poisoned mist ready for the first fatal bite of the newly hatched codling.

Successful spraying for insect injury preceded success in the more difficult fight and more dangerous enemy—parasitic fungi—

Reprinted by permission from The Farmer's Advocate, London, Ontario, Mar. 11, 1943

more dangerous in the sense of causing greater total loss. Based roughly on form and simplicity of organization, these are classified as viruses, bacteria and true fungi.

"Virus," one of the two words which the Romans used for "poison," was adopted for the class of infective agents which until quite recently defied discovery. It is exemplified in smallpox, measles, infantile paralysis, yellow fever and other human diseases, as well as in numerous diseases of plants. Potato leaf curl was well described 170 years ago and supposed at the time to be due to some kind of insect poisoning. A century elapsed before the discovery that insects are only the carriers of the cause. Their extreme minuteness had made it impossible to detect them with the most powerful compound microscopes due to the failure of light to magnify more than 5,000 times, even by photography with ultra-violet light. In the research laboratory of the Radio Corporation of America about two years ago a microscope was built capable of using electrons in a magnetic field and of magnifying particles 30,000 times their real diameter. Viruses will now be brought within recognition and measured in Angstroms—a unit equal to the 250 millionth part of an inch.

The effects of virus infection of plants are known under such names as potato leaf curl, peach yellows, tobacco mosaic, cherry ring-spot, tobacco streak, soybean curly top, lily rosette, and raspberry streak. Numbering is also used when a plant has several virus diseases; potato yellow dwarf, e. g. is "potato virus No. 16." These common names may be misleading; not every leaf-curling or streaking is due to a virus.

Possibly few plants, cultivated or wild, are entirely immune. Some kinds may harbour only one kind of virus, and some viruses affect only one kind of plant. The "yellows" of china aster is listed on many species of hosts. Remedies must be directed against transmission. The discovery was made in England not long ago that cigarette smokers were the agents in transmitting tobacco mosaic to young tomato plants. The suspicion was verified by experimental cultures of germs that were present on cigarette wrappers. In at least one U. S. Experiment Station bulletin, smokers were advised to wash the hands well before handling tomato seedlings. Spraying is remedial only to the extent that it deters insects — the chief transmitters of virus diseases. Little is known yet about hereditary transmission by seeds; it is accepted that bean mosaic is carried in this way. Happily differ-

ent races or strains of some economic plants vary in resistance from mild infection to immunity. For all that is known yet there may be beneficent viruses as well as virulent ones.

The boundary between viruses and bacteria may be more imaginary than real. The latter are large enough to be seen with a good optical microscope. Some kinds of bacteria were recognized and described more than 200 years ago, but it is only about half that time since any kinds were discovered to be causes of plant and animal diseases. In 1875 the German doctor, Robert Koch, proved the first causative connection of bacteria with animal disease and in 1882 made the historic discovery that tuberculosis is caused by the action of germs—living microscopic rods—that he named Bacillus tuberculosis. Three years after Koch's first discovery, T. J. Burrill in Illinois proved that pear blight, previously called fire-blight because it was attributed to lightning, is really due to a bacterum —Bacillus amylovorus—becoming the first in the list of bacterial plant diseases. While many species of bacteria are injurious to food and other useful substances, causing rots, blights, and wilts to plants and mild to fatal diseases to mankind and animals, the majority are either useful or harmless. In a list of books on bacteriology the oldest date noticed was 1887. Since that time enough papers and books on bacteria have been published to fill a library.

The history of the Fungi higher than Bacteria, most of them having a vegetative body as well as a reproductive one, begins in the cretacean rocks antedating the history of mankind. They are familiar as mushrooms, puff-balls, rusts, smuts, mildews, scabs, leaf-spots. They have an important place in nature; some are useful in various ways to mankind, many are injurious. Nearly every herb, shrub and tree is liable to attack by one or more parasitic fungi; twenty-five of them have been found on the root, stem and leaf of the tomato, thirteen on the garden rose, and forty on the apple. In 1913 Saccardo and Trotter's census of described species of fungi reached a total of 66,615. As in the case of bacteria, while hundreds are parasitic on plants and animals, a much larger number are either harmless or useful in some way.

This is the field in which science and skill, materials and machinery, serve the farmer and fruit grower. Effective treatment of black knot on the cherry is different from scab on the apple, of mildew on the strawberry from smut on the wheat, of loose smut from covered smut on oats.

Waxy Kafir, Substitute for Cassava Root

Condensed from Farm and Ranch

Arlee Gowen

WHEN Java fell to the Japs early in 1942 with it went America's source of cassava root from which tapioca flour, glue and various other products are made.

Almost immediately General Foods Corporation, one of the manufacturers of the confiscated product, asked the Experiment Station at Lubbock, Texas, for samples of Waxy kafir starch for experimentation. So enthusiastic was the reception of this new food source that General Foods dispatched a representative from Battle Creek to Lubbock with instructions to contract with West Texas farmers for the planting of several thousand acres of the waxy type grain sorghum to replenish their rapidly diminishing supply of cassava root flour.

In Lubbock and neighboring counties farmers contracted to plant 20,000 acres of the grain in 1943 in compliance with General Foods Corporation's request. General Foods has agreed to furnish the seed free to farmers, supervise its growing and pay farmers the market price plus a special premium for growing the first commercial crop of the grain sorghum. In this project General Foods invested $75,000, expecting to produce 30,000,000 pounds of the grain in experimental areas at Lubbock, Littlefield, Levelland, Dimmitt and Abernathy.

Extra precautions have been given the seed, only 40,000 pounds of which are in existence. Under the care of expert seedmen at the experimental station the seed was treated for smut and also received a treatment of Ceresan to protect it from spores and seed rot. The creamy-white grain seed was then carefully distributed in small amounts among farmers on the South Plains by General Foods and local county agents.

Agricultural experts on the South Plains predict that the new kafir may within a few years become one of the most important grain sorghums produced in the South.

With the advent of the kafir substitute, America has a new adhesive in the textile industry and for making surgical dressings.

What gives it its peculiar value is the chemical constitution of the starch in the dull-coated waxy-looking seed, which contrasts no-

Reprinted by permission from Farm and Ranch, Dallas, Texas, July, 1943

tably with the harder, shinier "finish" of ordinary sorghum grain seed. Incidentally, despite the name, there is no wax in the seed; it only looks waxy. The starch derived from the grain has the property of absorbing water and forming a paste similar to tapioca. With different chemical treatment, it also becomes a good adhesive, either for paper, as on envelopes and stamps, or for sizing cloth.

Twelve years ago Karper found this waxy character in certain grain sorghum plants and worked out its inheritance. At that time the agronomist published his report on the new development in the *Journal of Heredity*.

Under the direction of the Lubbock Station a variety of sorghum known as Batad was imported from the Philippine Islands in 1935. With this grain sorghum, having a peculiar type of waxy endosperm, the station began a systematic breeding program. The agronomists proposed to transfer this waxy endosperm character over into our common American varieties of kafir and milo.

The endosperm or starchy matter in the seed furnishes the bulk of the grain's food value. This starch material is creamy in color and consistent in texture, differing from the starch material of ordinary grain kernels having an exterior of hard transparent starch and an interior of soft opaque starch. Waxy seeds are hard and quite brittle. Another contrast between the two seed types results when treated with iodine. The waxy seed turns reddish while the normal kernel turns blue.

Attempts were made to interest a number of concerns who use this type of starch in food manufacturing, but since the imported cassava flour existed in abundance, no interest was aroused.

But when 350,000,000 pounds of imported tapioca flour were stopped in the flow from the Orient to the United States, high-speed packaging machine manufacturers, government printers, sizing mills, textile manufacturers and paper mills were forced to find a new glue. At present it seems that Waxy kafir is the answer to their dilemma.

Synthetic rubber may receive an added impetus from Waxy kafir starch, according to technicians at the Northern Regional Research Laboratory in Peoria, Illinois, where the grain has been tested in the production of alcohol. This alcohol will be converted into butadiene for the manufacture of synthetic rubber.

Should this process be adopted in the rubber industry, vast farm acreages will be required to supply the nation's demand for the grain.

Anticipating the present labor

shortage, farmers in the Lubbock area have planted grain sorghums that have short stalks and lend themselves readily to machine harvesting. Waxy kafir can be threshed in the field with combine harvesters, but farmers in the South Plains area have requested the station agronomists to produce a waxy kafir with a shorter stalk.

Waxy kafir, like other sorghums, is a good crop for parts of the country where drought may occur at any time during the growing season. It is also a good soil binder, holding fields against erosion.

Inspect Your Wiring

Condensed from The Michigan Farmer

D. Emerson Wiant

Assistant Professor of Agricultural Engineering, M. S. C.

FOR several weeks, I had been planning to get away from the laboratory and visit a farm well stocked with electrical equipment. I was interested in learning how the farmer is taking care of his equipment and whether there is anything we can do to help him make his equipment last and give him more satisfactory service. So I phoned a nearby farmer a few evenings ago and told him that I would be there the next morning.

The milking was finished when I arrived, done with a mechanical milker. I started to work on the milking machine. The milker had been over-oiled, and the motor cord was wound 'round and 'round the milker pipe line. The cream separator was powered by a split phase motor which is not the right type of motor for such a hard starting job. When the owner asked why it took longer to milk than it used to, I asked him when the milker pipe line had been cleaned. It had been 4 or 5 years. About that time the owner decided that if I insisted on finding something wrong with all his equipment he might as well include the wiring. I am glad that he did, because we found several hazards that may be present and are being overlooked on many farms.

The wiring appeared to be all right. It was knob and tube, installed at least 12 years ago and had never given any trouble. A

Reprinted by permission from The Michigan Farmer, Detroit, Michigan, July 3, 1943

casual inspection showed a loose lamp receptacle hanging from the outlet box. The lamp was located above the alleyway and mounted so low that occasionally the stock bumped it and broke the bulb and finally loosened the receptacle. Two screws were needed to fasten the receptacle in place, but when I pushed it into place, the lights flickered. That meant a loose connection. Finding none in the box, I followed the wire and found the trouble not more than three feet from the box. One of the wires had been spliced by the simple procedure of hooking the two ends together. The many coats of whitewash that I scraped off the wires indicated that the dangerous condition had existed for years. Evidently the wiring did need inspecting.

The horse barn contributed two interesting examples of hazards. One was a barn swallow's nest which used the electric wires for re-enforcing the nest. The other was the wiring above a horse stall where a horse, which won three first prizes last year, was stabled. Some horses have a habit of chewing at anything that they can reach. Wiring, especially around box stables, should be located so that horses or other stock cannot reach it.

An inspection of the outdoor wiring resulted in finding an example of a dangerous condition in the making, a condition which while not dangerous at present, is a potential hazard. If these wires were not relocated, then, just as sure as winds continue to blow, some day the insulation will wear through and a deadly condition will exist.

What started out to be a study of equipment turned out to be more of a session of wiring inspection. However, it was more pleasant than trying to figure out how the barn got on fire had that "outlaw" splice become hot and dropped a spark in some loose straw; or what killed the $500 horse, had he chewed the wires over his head.

Wiring should be inspected at least twice a year. Inspection and servicing of equipment, the frequency depending on the type of equipment and the amount it is used, should be part of the procedure of using equipment and certainly will prolong its life, save repairs, and make it more efficient.

More Acres Per Machine

Condensed from Iowa Farm Economist

Earl O. Heady

TO spread the use of labor saving machinery over as many acres as possible, farmers intend to share their machinery with each other considerably more than in previous years.

This will make the limited supply of new implements go a long way and will result in a considerable saving of labor. Machine owners will be able to lessen fixed costs on their equipment by spreading them over more hours and a greater acreage. Studies at Iowa State College have shown that the life of a machine and the repair bill are not greatly affected by the amount an implement is used.

To get the most co-operative use of machinery custom rates must be on a fair basis. These rates should cover the owner's machine, power and labor costs with an added payment for the risk and management involved. On the other hand these rates should not be so high that they exploit the farmer who must hire custom work.

Iowa State College has endeavored to set up such a table of custom rates that will strike average charges for the state. The method of arriving at the total rate has been carefully outlined so that this table can be adjusted to local conditions. The table should not be regarded as inflexible; rather it should be used as a model to follow in figuring the custom rates for each locality.

Column 1 shows the average number of machine, tractor and man hours per acre for each machine. This average is based on a large number of reports received at Iowa State College, but it must be adjusted to meet local conditions. Weather, size and levelness of fields, weeds, contour planting and similar factors will make the number of hours vary in different neighborhoods.

Column 2 indicates the wages per hour used in estimating the rates. Wage rates will vary from locality to locality according to the season and to the labor supply. During corn husking $7 to $10 may be paid daily, whereas

Reprinted by permission from the Iowa Farm Economist, Ames, Iowa, June, 1943

during March and April $3.50 may be good wages. Also, skilled labor is needed more for corn picking and combining than for harrowing and disking.

Column 3 carries the hourly charge for tractor use. Studies show that the cost of depreciation, interest, taxes, housing, fuel oil and grease for a tractor averages about 60 cents per hour for most operations and 55 cents for light loads. These rates also vary between localities.

Column 4 indicates an additional percentage charge as an adjustment to allow for owner responsibility, time required in overseeing the work and for the time and expense involved in moving from one job to another. In the case of the more numerous machines, this charge may be around 20 per cent of the combined machine, power and labor costs. But for machines like the combine and cornpicker this additional margin may be as high as 50 per cent, since it will also include a scarcity premium. This scarcity cost will exist because the number of machines is short relative to the demand and the cost of performing the operation by hand is high. When machines can again be freely purchased in the market much of this scarcity premium will disappear.

This additional margin may vary much over the state, depending upon the supply of and demand for certain machines.

Column 5 shows the average machine cost per acre. The figures are based on a study of 3000 farms carried out at Iowa State College. Depreciation, interest, insurance, taxes and housing costs are included.

Column 6 contains the labor cost per acre. It is figured from columns 1 and 2. For example, corn planting takes .40 hours per acre. The labor charge, 50 cents per hour, is in column 2. .40 x .50 = 20 cents, which is the labor cost per acre for corn planting.

Column 7 gives the power cost per acre. It is figured from columns 1 and 3. For corn planting each acre takes .40 tractor hours at 55 cents an hour. .40 x .55 = 22 cents, the tractor charge per acre.

Column 8 lists the management and risk charge. It is found by multiplying the rate in column 4 by the sum of columns 5, 6 and 7. For example, the machine cost of corn planting is 13 cents plus the labor cost of 20 cents, plus the tractor cost of 22 cents which gives a sum of 55 cents. The rate is 20 per cent. Twenty percent of 55 is 11 cents, the risk and man-

agement charge per acre of corn planted.

Column 9 carries the total charge per acre. It includes payments for the machine, labor, power and risk and management costs involved. This figure is obtained by adding columns 5, 6, 7 and 8. Hence 13 plus 20 plus 22 plus 11 equals 66 cents, the total charge for planting one acre of corn.

The farmer should not forget that these are averages and should be modified to meet local conditions.

Farmers Suggest Rates

Column 10 shows the rates most commonly suggested by farmers for 1943. These are only suggestions and, like column 9, do not necessarily apply to any one locality. However, it is interesting to compare the estimates of Iowa State College based on cost factors with these estimates of farmers. The cost factors may be altered according to local conditions, and it is by using the local costs and following the indicated method that this table can easily be applied to local conditions.

Custom rates in 1943 will be considerably higher than those of normal times. Part of this increase will be due to higher wage rates. As long as wage rates climb, custom rates may be expected to increase. The other chief factor in the higher custom charges is the increasing use of labor saving machines because of larger crop acreages and the limited production of new machinery. As long as this demand continues and the supply of new machinery stays low, custom rates may be expected to stay above normal.

CUSTOM RATES FOR FARM MACHINERY

Machine	Man, tractor, and machine hours per acre	Rates per hour		Percent added for risk and management	Rates per acre					Charges suggested by farmers
		Labor rate* per hour	Tractor rate† per hour		Machine cost per acre	Labor cost per acre	Tractor cost per acre	Mgm't. and risk charge per acre	Total cost per acre	
	1	2	3	4	5	6	7	8	9	10
Combine 5 ft.	.83	.60	.60	50	.63	.50	.50	.82	2.45	2.75
Corn picker, 2-row	.81	.80	.60	50	.64	.65	.49	.89	2.67	3.00
Corn planter 2-row	.40	.50	.55	20	.13	.20	.22	.11	.66	.60
Cultivator 2-row	.51	.50	.55	20	.07	.26	.28	.12	.73	.75
Disk, single 10-ft.	.32	.40	.60	20	.05	.13	.19	.07	.44	.50
Disk, double 8-ft.	.42	.40	.60	20	.06	.17	.25	.10	.58	.75
Ensilage cutter, stationary	1.67	.60	.60	50	.21	1.00	1.00	1.11	3.32	
Grain binder, 8-ft.	.47	.60	.60	20	.35	.28	.28	.18	1.09	1.00
Grain drill, 12-ft.	.30	.50	.60	20	.17	.15	.18	.14	.60	.50
Mower, 7-ft.	.42	.50	.55	20	.17	.21	.23	.12	.73	.70
Plow, 2-bottom	1.16	.50	.60	20	.19	.58	.70	.29	1.76	1.75
Rake, dump	.30	.50	.55	20	.13	.15	.17	.09	.54	.35
Rake, side delivery	.33	.50	.55	20	.14	.17	.18	.10	.59	.45
Spike, harrow, 18-ft.	.15	.40	.55	20	.02	.09	.12	.05	.28	.25
Spring tooth harrow	.38	.40	.55	20	.05	.15	.21	.08	.49	.50

*Varies with season and skill required for operation.
†Varies with load.

Soil and the Americas in the Post-War Era

Condensed from Land Policy Review

H. H. Bennett

Chief, U. S. Conservation Service

AGRICULTURALLY, the Americas are bountifully rich in possibilities. Practically every crop known to mankind will grow somewhere in the many types of land and climate in the Western Hemisphere. The mountains, the high plains, the valleys, and the coastal areas all have possibilities in the production of food and fiber for the post-war world. These vast resources are being tapped only partially in the fight for freedom by the United Nations, and just as we are fighting for a better world, so too are acres and hectares of the Americas destined to provide a foundation for the age of plenty in a world of peace.

In the post-war period the American Republics will have untold opportunity to develop scientifically a surprisingly large area of land that has never been touched by the plow. During the decade of the 1930's in the United States, a wealth of experience and material was obtained in the work of the Soil Conservation Service of the Department of Agriculture. The data form the key with which the Americas can unlock the door to a world of abundance that will become man's heritage merely by the application of proper land-use practices on the soil.

But basic to a broad conservation pattern in the hemisphere there first must be the application of a land-use classification method to ascertain the needs and adaptabilities of the various kinds of land and land conditions. For example, degree of slope, kind of soil, severity of erosion, stoniness, wetness, organic-matter content, acidity, and other readily determinable physical and chemical characteristics entered into the calculations which mapped millions of acres of land for practical conservation use in the United States.

Few things would hold more possibilities of good for the Americas than a careful survey by all nations of their lands, working together according to a standardized system of classification. With such basic information it would be possible to develop field procedures for an orderly production of crops over the entire hemi-

Reprinted by permission from Land Policy Review, Washington, D. C., Summer, 1943

sphere for the best interests of all concerned.

A survey of this kind would show how much new land we have, where it is, and what we could and should do with it. It is necessary that we know our land intimately before we can work out a safe and efficient program of cultivation. Only when the American Republics know what their land is capable of producing, what sort of crops it is best suited to grow, and what sort of care the soil must be given, will they have the background necessary to obtain full productive capacity over a period of centuries.

Abundance — achieved from greater yields and the proper use of all of the land — will go far toward eliminating hunger, and likewise the greed which too often breeds from want, undernourishment, and starvation. Conservation practices applied to all the land, including the vast reservoir of soil yet unused, can play a vital role in cementing the good neighbor policy into a permanent, workable way of life.

A fair extent of idle, undeveloped land remains in the United States but there is a great deal more in certain parts of Central and South America where the coastal zone, or littoral, and the great valleys stretching far inland offer splendid opportunities for agricultural development. There seems no doubt but that the truths of conservation farming as found in the United States will apply elsewhere, so that contour cultivation, terracing where necessary, and other soil-maintenance and soil-protection measures will not only conserve the basic resource but will materially increase production in these areas.

The tropic and subtropic regions of the littoral have bright possibilities for the production of crops for which there are tremendous markets. Proper development and wise cultivation of this soil should result in production of cacao, coffee, bananas, balsa wood, kapok, tapioca, rotenone-bearing plants, spices, gums, vegetable oils, cinchona bark for quinine, and rubber.

But for the duration, the chief task is to produce more of the crops required immediately to meet the abnormal demands of a global war. These demands can be met through widespread application of simpler conservation practices which boost yields and at the same time maintain the land in good condition.

Fortunately these simpler practices provide an excellent foundation for the expansion of complete conservation farming over the hemisphere in the future. This post-war pattern of American farming should be broadened to include using all the land according to the crops or uses for which it is best suited. It should include

terracing land that cannot be safely cultivated otherwise, contour cultivation and strip cropping on lesser slopes, reforestation of woodland that should never have been cleared, returning to grass the grassland that should never have been plowed. It should include the control of floods at their source and the prevention of sedimentation which fills up and ruins reservoirs, streams, and ditches. It should include conservation of wildlife to maintain the ecological balance of nature and conservation of natural water resources. It should bring into cultivation good idle lands that never have been utilized in order to offset the land that must be taken out of cultivation; it should bring drainage or irrigation in regions where necessary. And always it should maintain the fertility of the soil itself by application of lime, manure, and fertilizers, to augment a good rotation of crops.

Judging from increased erosion-control activity throughout the Americas, it seems reasonable to expect that a pattern of complete conservation farms will spread over most of the hemisphere in the post-war era. There has been some erosion-control work almost since the beginning of American agriculture but it is only in comparatively recent years that soil conservation has been appreciated fully—to the extent that it not only preserves the land but also increases the land's productivity.

Amazing results of conservation farming in the United States, beginning with erosion-control emergency measures 10 years ago, have created interest in similar work in Central and South American countries. The United States Department of Agriculture has accepted invitations to send missions into the neighboring countries to study erosion problems and other agricultural matters. The Governments of many of the republics are now actively carrying out plans to combat the erosion that is resulting from misuse of the land.

In Brazil, agricultural expansion has been followed by severe erosion because much forest land was cleared without adequate reforestation. Brazil is attacking the problem through demonstration and experimental projects.

In Chile, there is an erosion problem in which floods and silting are the major obstacles to be overcome. The Government has taken steps to remedy the situation by planting trees on marginal farm lands, changing agricultural methods particularly in the arid areas, and encouraging cattle raising in the humid zones.

By making an intensive study of serious erosion in northern and eastern parts of Venezuela, that Government is working on con-

trol of erosion. Likewise, erosion-control action has been started by the Government of Colombia. Provisions have been made for the establishment of "protected forest zones" where lumbering operations may be carried on only under governmental supervision. State nurseries have been established to aid in the reforestation of denuded areas.

Wind erosion in the semiarid regions adds to serious erosion by water in the areas of abundant rainfall in Argentina. The Government, in businesslike manner, has set up a soil-conservation program to combat the menacing condition which has been caused by too intensive cultivation and overgrazing of steep slopes.

Although there is considerable erosion locally, the situation confronting Peru is different in that conservation of water is the major objective. Experiments are being carried out on diversion of flood waters from rivers to irrigate suitable adjacent lands and the results indicate that production may be boosted by one-third through an adequate water supply for crops and the bringing of more desert area into productive use.

With as much as 75 percent of some areas completely ruined and out of cultivation, erosion is extremely serious in Ecuador, and such wastage of land naturally is throwing an additional burden on the remaining soil. One of the gravest problems confronting the Ecuadorian Government lies in finding enough land resources to support the population in coming years. Specialists from the United States Department of Agriculture have recently made a study of farming conditions in Ecuador; they report that intensive cultivation, especially on steep mountain slopes, has contributed to much soil wastage.

Erosion is a serious problem in many localities of Mexico, particularly on the steeper slopes that have been under cultivation for generations. In parts of Mexico farmers for years have practiced the building of stone fences across slopes, approximately on the level, apparently to catch soil moving downhill under the impact of uncontrolled run-off of rains. In time this practice brought about a development of bench terraces that are nearly secure against erosion. Something of the same kind has been accomplished in other fields by contour plantings of maguey. In parts of northern Mexico, where grazing has not been severe, are the best natural grazing lands to be seen anywhere under conditions of low rainfall.

Erosion damage in some parts of Uruguay is serious. In the West Indies much of the land, particularly in Puerto Rico and Haiti, has been severely impover-

ished. Certain parts of Cuba have suffered, but considerable of the land there is highly resistant to erosion because the surface is nearly level and the soil has a high capacity to absorb rainfall.

The abundance that can come from proper use of all the land of the Americas can guarantee at least one of the four freedoms of the Atlantic Charter. And along with freedom from want will come, in a large degree, the realization of the other three freedoms, because where there is plenty of the fruits of man's genuine labor, there remains little room for fear, or religious persecution, or curtailment of expression of free men's thoughts.

Conceivably conservation farming on a complete hemispheric scale not only can cement the Americas into a permanent community of good neighbors but it also can make the American way of life so abundant and so attractive that no European country nor any Asiatic empire can shackle living democracy with military dictatorship. Then learning to work with the good earth, men of all nations, races, and creeds can live as brothers in an age of abundance.

Way to Cut Milk Costs

The pasture combination that Harvey W. Enzian uses in Kalamazoo county, Michigan, keeps a dairy herd supplied with green feed from April 15 until fall-seeded rye is frozen down in early winter. Enzian seeds rye August 15. That permits it to establish a deep-root system before winter sets in and gives a maximum of fall pasture. Last fall brome-alfalfa pasture still was good when rye was ready to graze September 22.

"By using the seeded pasture which lasts latest in fall and starts earliest in spring in combination with brome and alfalfa, the best permanent pasture crop, I save a lot of hay-making and feeding labor," Enzian said. "My pasture program saves grain, too. Brome and alfalfa is so rich cows will not eat much grain when they graze it. That is especially true toward the end of lactation, but the heaviest producers in the herd will not consume as much grain as when they are on dry feed."

Enzian, who milks 27 cows, has had a herd average around 400 pounds of fat a cow in recent years.

—*Capper's Farmer*

Save That Manure!

Condensed from The Western Farm Life

IT is estimated that 1 billion tons of manure are produced in the United States annually. In this, there are plant nutrients equal approximately to six times the amount produced in all commercial fertilizers. Manure is a by-product of great importance and without the return of this residual material, the present system of agriculture could not go on.

The average amount of manure recovered from the different classes of farm animals on 224 Illinois farms as computed by Ross of the Illinois experiment station is reported below. The amounts are given in tons per animal unit, which consist of one cow, steer, or horse, five hogs, seven sheep, or 100 chickens.

Kind of Manure	Animals Per Unit	Tons Year
Horses and mules	1	5.5
Steers	1	1.2
Dairy Cattle	1	6.6
Sheep	7	.8
Hog	5	1.7
Poultry	100	1.9

The composition of manure also varies widely, and it is interesting to note how they compare in amounts of nitrogen, phosphorus and potassium. The figures below show amount of nutrients in pounds per ton of manure containing 75 to 80 per cent moisture.

Kind of Manure	Nitrogen	Phosphorus	Potassium
Horse, with straw	11	5.5	13.2
Steer, with straw	11	7.0	9.6
Dairy cow, with straw	9	6.0	8.4
Sheep, with straw	20	9.0	16.8
Hog	13	12.7	9.6
Poultry	18	17.5	9.6

Sheep, hog and poultry manure runs considerably higher in nitrogen, phosphorus and potassium than that of the larger animals. The good results often obtained with these manures is because of the higher percentage of plant food. Average cow manure containing 75 per cent moisture and mixed with the straw bedding contains 9 pounds of nitrogen, 6 pounds of phosphorus and 8.4 pounds of potassium to the ton. On this basis, it represents approximately a commercial fertilizer with an analysis of 0.5—0.3—0.4, meaning 0.5 per cent nitrogen, 0.3 per cent phosphorus, and 0.4 per cent potassium. In other words, it would take 1 ton of manure to equal 100 pounds of a commercial fertilizer with an analysis of 10-6-8.

The mineral analyses of manure is low, and this is especially

Reprinted by permission from Western Farm Life, Denver, Colorado, March 15, 1943

true as regards phosphorus. The humus or organic content of manure is probably of more value on most soils than the mineral content, and a great many soils have a poor physical condition. The heavy soils are too compact and the sandy soils are too loose. Manure or other organic residue is the best means of improving the texture of these soils.

Second to the value of humus in manure is nitrogen. A portion of this element is in a stable form; that is, it is not easily lost or given up. This stable nitrogen is in the form of protein or protein-like compounds and is released slowly as decomposition takes place. It can then be used by the crops as it is needed, and is not lost during irrigation or the movement of water in the soil. However, the ammonia nitrogen in manure, being volatile, or in liquid form, is easily lost.

As seen by the analyses, the phosphorus content of manure is low. Horse manure contains the least, or 0.27 per cent, and poultry manure the most, 0.87 per cent. It would take 8.1 tons of horse manure to equal 1 bag of treble superphosphate as a source of phosphorus.

In most manures, potassium is higher than phosphorus. Because of the abundance of potassium in western soils, the value of this element is of little importance as compared with nitrogen and phosphorus. The potassium in manure is largely water soluble and is subject to considerable losses by leaching.

The cash value of manure has been estimated by various authorities. The average is around $2.50 a ton and will vary widely on different soils and for crops of different value. In considering the returns from manure, the labor costs to apply it on the fields takes a good part of the profit from its use.

Investigation in Nebraska shows that the most profitable use of manure is made by making lighter applications than is the usual practice. Six tons of manure an acre reinforced with 125 pounds of treble superphosphate produced the maximum increase in yield of beets per acre per ton of manure. The application of phosphate may be made as a separate operation or it may be sprinkled on the manure at the time that it is spread.

Losses of the valuable constituents in manure are greater than is generally realized, for about 50 per cent of the value of manure is contained in the liquid excreta. Under ordinary conditions, this liquid is held only by absorption in the dry bedding material, thus the importance of keeping a good supply of dry litter under the animals.

The losses by volatilization of ammonia are perhaps greater

than by run-off or the leaching away of the liquid portion of manure. Volatilization begins as soon as manure is produced and continues even after it is incorporated with the soil. This loss cannot be avoided entirely but can be reduced. The first and best measure is to get the manure into the soil as quickly as possible. Often this will be delayed several months, but, manure should be used as soon as conditions permit.

In the absence of storage facilities, the best policy is to pile the manure in piles at the corral or in the field. Usually it is moved to the field in advance of the spreading and here the storage piles should be large.

When time is available to spread the manure, it should be covered as quickly as possible. Sometimes it is spread, disced into the soil, and then plowed under in the same day. Every hour the freshly spread manure lays exposed to the atmosphere, there are great losses of nitrogen, which is so badly needed by the crop that is to follow.

For some specialized purposes, a well rotted manure is desired, but this is a very expensive product. The losses during rotting are not apparent unless one has observed the reduction in the size of a pile of manure in storage. In a few months the volume of a manure pile will decrease one-half, and the loss in quantity far exceeds any gain in quality.

It has been suggested that manure be stored in large piles to prevent losses of nitrogen by evaporation of ammonia. But, if it is left too long in large piles, a high temperature develops, causing not only losses of ammonia, but also reduces the total dry matter at a rapid rate. If manure is to be stored over a period of months, it is advised not to pile it in deep piles because of the tendency to burn.

The benefits derived from manure will depend largely on the time and method of storage, and rapidity with which it is worked into the soil, when it is spread on the field. Manure should not be looked upon as the only means of keeping up soil fertility. In the first place, it can never be produced in sufficient quantities to meet all crop demands. As has been shown, the losses are great, and this together with the fact that crops and livestock are shipped off the farm, makes it necessary on the average farm to return more nutrients to the soil than can be supplied by manure alone. Additional nitrogen must be taken from the air by legumes, and phosphorus must be brought to the farm from natural mineral sources to compensate for the losses that are unavoidable.

PRIZE ESSAY

The F. F. A.'s Contribution to National Defense

Karl Swain

Grandview, Texas

FROM the waving palms of Hawaii to the sun-kissed wheat fields of Kansas the F. F. A. boys are struggling toward a total victory over the axis powers. Yes, all over these United States and her possessions the Future Farmers are all out for National Defense. The Future Farmers are just as eager to end this war as anyone else and for this reason are speeding up production of food and clothes products.

The F. F. A. is one of the best trained boy's organizations in the world. They elect club officers and are trained under the supervision of their advisor. They go on field trips to get experience at first hand in such jobs as terrace lines, dehorning and pruning, and budding fruit and nut trees. This helps the farmer improve his farm so as to raise more and better products and, at the same time, gives the boys experience that will be of help to them in the future.

The projects of the Vocational Agriculture boys have been very helpful in National Defense. The classes in V. A. have encouraged the boys to have longer and better projects than ever before. Some boys have small farms rented and raise a large quantity of livestock; expenditures and receipts are kept, and profit is figured.

Group harvest of cotton and corn was made by different chapters. The money was spent for bonds and put in the chapter funds. This partly solved the acute labor shortage in some localities and added a generous sum of war bonds.

The different chapters secured trucks and trailers and went about the country collecting scrap iron and steel as well as scrap rubber. When this was sold, it was either turned into war bonds or used for the purchase of registered gilts as a group project. These were given to the other members of the chapter until all owned registered gilts; consequently, boys who would not have done so otherwise became

owners of registered stock. This encouraged improvement, one of the key words of the F. F. A.

Electric brooders, given by a certain feed company to F. F. A. Chapters, have been used to raise chickens. When they have reached frying size, they are dressed for the annual father and son banquet which is held in some localities. This solves the meat shortage problem and gives the boys the experience of caring for the chickens.

Work shops have been set up by the government in many sections of the nation, where the chapter boys make such useful things as lawn chairs, tool boxes, chick feeders, self feeders for pigs, milk stools, chisels, punches, and many more farm supplies. By doing this, they have been able to acquire supplies that they would not have owned, had it not been for this modern, well-supplied shop.

Experiments have been made with seed, feed, and animals, in methods of growing better animals and feeding so as to make changes for the better. It was surprising how much improvements increased production.

Each year the state selects twenty-seven F. F. A. boys as state farmers. Thousands of eager boys strive to get good registered projects so as to be chosen. The winners are given a free trip to the state capital plus a war bond. This indirectly boosts food production, because each boy wants to be just as favorable for the contest as the next.

The American farmer's degree marks the highest grade of membership achievement in the organization; qualifications of this award are chosen much the same way as are the state farmers. Each state is allowed one candidate to every thousand members. The candidates must have several desirable projects before they will have a good chance at the award. The winners are awarded a free trip with expenses paid to Kansas City where the National Meet is held. He is given a golden key which opens the gate to a larger field of endeavor and which signifies that he has achieved the highest honor offered.

The true American Farmer in the F. F. A. sees beyond the horizons of Greenhand, Future Farmers, and State Farmer. He concerns himself not only with the affairs of his local chapter and state associations, but also with the National organization, working for the upbuilding of agriculture throughout the land, which, in turn, upbuilds his state and local community.

These organizations encourage the members to do better in order to acquire one of these awards; thus he produces more, helping the war effort that much more.

In many sections of the coun-

try F. F. A. members are encouraging people to plant victory gardens by giving them farm bulletins on gardening and how to plan a garden. They also are asking the city people to sign a list saying they will plant a victory garden in their flower beds if garden space is not available. These people, pleased with the boys' interest in National Defense on the food front, are glad to do all they can by complying with these requests.

Through the help of the F. F. A. certain cities and towns all over the nation were able to get government canneries where the general public was able to go and can the harvest of their victory gardens.

The F. F. A. asks the boys at the date of their high school graduation to trade their projects to the State Agriculture and Mechanical Colleges for a payment on their college education. Here they are taught a wide variety of subjects pertaining to animals on farming. After their training here they may become officers in the United States Army. There are more graduates of these Colleges that receive military honors than any other military academy in the United States. Service honor rolls show more former F. F. A. boys who have fought and died for their country than members of any other organizations.

The F. F. A. instills something in these boys that makes them rally to their country's call; this something cannot be taken away from them, no matter how desperately the enemy tries.

The Future Farmers of America will not rest until this dreadful thing is over. They know we did not ask for this war, and for that reason more than ever they are working toward that yonder horizon of Victory. *Learning to Do, Doing to Learn, Earning to Live, Living to Serve,* will be their motto, not only in the organization, but also in the aims for National Defense.

Alyce Clover Gets Her Chance

Condensed from Better Crops With Plant Food

Jack Wooten

Assistant Director of Information, Farm Credit Administration, Columbia, S. C.

ALYCE CLOVER, an annual legume but not a true clover which came from the East Indies where it has long been used as a cover and mulch crop in orchards, is spreading throughout Florida and some other Southern states.

The legume was introduced into the United States about 1910 and in Florida, for instance, has reached economic importance as a satisfactory hay for beef and dairy cattle and as a cover and seed crop. The clover has been tried in some counties in Georgia and South Carolina; however, agronomists there consider that Alyce clover is still in its experimental stage.

This legume, from the tropics of Asia, has fine stems which spread along the ground and turn up unless planted in stands that crowd them upright. The plants vary in height from 12 to 24 inches, depending upon the fertilization of the soil, and are relished by livestock as grain or as hay.

It is conceded that the climate in Florida generally is not suited to good haymaking, but Alyce clover, which is high in dry matter at the bloom stage when cut for hay, is easily cured. The hay, agronomists say, should be cut when less growth has been obtained and before any great amount of leaves is lost. In Florida, this legume may be cut for hay during late August, September, and October, when rainfall and dew are usually light, thereby facilitating rapid cure. In Georgia, it is ready to cut in late September or early October, depending upon the weather conditions and progress of the crop. The plant matures in late fall in South Carolina, and is cut for hay when in early bloom. When cut early for hay, a second growth will produce a seed crop. The seed can be harvested with a combine, or cut with a mower and stacked for threshing with a stationary thresher.

Alyce clover should be planted on soil which is well drained, since the plant cannot survive on water-logged soils. According to Messrs. R. E. Blaser, Geo. E. Ritchey, and W. E. Stokes of the Florida Experiment Station, it is advisable to use newly drained

Reprinted by permission from Better Crops With Plant Food, Washington, Apr., 1943

land, as virgin land is low in nematode populations and better results may therefore be expected. The crop is readily attacked by nematodes and should not be planted on land to be devoted to crops susceptible to this disease. Cropped land contaminated with rootknot and weeds is not recommended.

The legume is planted during the spring—preferably from April to June. The seed can either be broadcast or planted in close drills on the firm seedbed. Ten to fifteen pounds of hulled seed per acre should be planted, preferably at a time during favorable rainfall and soil-moisture conditions. It is recommended that the seed be covered lightly from one-fourth of an inch to one inch in depth, since deeper plantings result in failure.

On the experimental work reported, plants grown from uninoculated seed were well nodulated. "Alyce clover uses the same symbiotic nitrogen-fixing organism as many other cultivated and native legumes in the South," declare Messrs. Blaser, Ritchey, and Stokes. "Therefore, it does not seem necessary to inoculate the seed."

Fertilization requirements vary, the lowest economical fertilizer application being 200 to 400 pounds per acre of 0-16-16, or similar analysis. Dolomitic or calcium limestone applied at the rate of 750 to 1,500 pounds per acre may or may not give improved yields, depending upon the soil type.

In Florida, some farmers make large plantings of Alyce clover and though some of these plantings produce from one to three tons per acre, others are consistent failures. Accordingly, the Experiment Station set out to find the causes of these failures. Experiments were set up with fertility requirements, planting date, and depth of planting tests. Experiments were also established in several locations to learn what soil types are best suited for the legume. Six fertility and adaptation experiments were set up under different soil and moisture conditions. All tests were on virgin land except one fine sand plot which had been farmed and recently planted to carpet grass. Good seedbeds were prepared on all experiment areas except the one testing place which was lightly disked.

Needs Good Drainage

It was found that the seed on the poorly drained soil series germinated well, but most of the seedlings died when they reached a height of two to six inches.

Good stands and growth occurred on all the well-drained soils tested with the exception of the fine sand plot which had been farmed and planted to carpet grass. On this particular test, the

plants were dwarfed or died due to rootknot infestation. This soil was contaminated with nematodes as the land was once farmed and the subsequent planting of carpet grass also encouraged rootknot contamination. The test bore out the fact that for best results Alyce clover should be planted on virgin soil relatively free of the rootknot nematode.

Judging from the experience of Florida farmers and experimenters at the Florida Experiment Station, Alyce clover should not be used as a cover crop in a rotation where nematodes damage other plantings in the rotation. They have also found out that the legume may be expected to produce highest yields during the first year it is planted on any one field. The tests they have conducted on sandy soil show a large hay yield reduction in the two or three years' crops due to nematode injury.

In conclusion, the Florida agronomists declare that Alyce clover should be cut for hay when it begins to bloom. At this stage they say plants may vary from 10 inches to three feet in height, depending upon the fertilization practices and soil types. Sometimes two cuttings of hay may be obtained in one season, but generally it is desirable to make one cutting of hay and harvest a portion of the seed from the subsequent growth. They add, that since this legume is an annual, sufficient seed should be left in the field for the next season.

FOR THE FARMER'S LIBRARY

These books are recommended as outstanding in their field:

Animal Sanitation and Disease Control—By Dr. R. R. Dykstra, Dean of the School of Veterinary Medicine, Kansas State College. The Interstate Printers and Publishers. $2.85.

Beef Cattle — By Roscoe R. Snapp, Asso. Prof. Animal Husbandry, Univ. of Illinois. John Wiley & Sons, Inc. $4.00.

Beef Cattle Production in the South—By D. W. Williams, Head, Department of Animal Husbandry, A. & M. College of Texas, College Station, Texas. The Interstate Printers & Publishers (1941). $2.00.

Beekeeping — By Everett Franklin Phillips, Professor of Apiculture, Cornell University. The Macmillan Co. $4.00.

Dairy Cattle and Milk Production—By Clarence H. Eckles, B.S.A., D.Sc., late Chief, Div. of Dairy Husbandry, Univ. of Minnesota. The Macmillan Co. $3.90.

Dairy Science—By W. E. Petersen, Ph.D., Assoc. Prof. and Assoc. Dairy Husbandryman, Univ. of Minn. Edited by R. W. Gregory. J. B. Lippincott Company (1939). $4.00.

Farm Accounting—By Donald R. Mitchell, Asst. Prof. Agri. Economics, Univ. of Wisc. McGraw-Hill Book Co., Inc. (1941). $2.50.

Farm Shop Practice—By Mack M. Jones, M.S., Prof. Agri. Engineering, Univ. of Mo. McGraw-Hill Book Co., Inc. $2.75.

Feeds and Feeding—By F. B. Morrison, Prof. of Animal Husbandry and Animal Nutrition, Cornell Univ. Morrison Press. $5.00.

Farm Meats—By M. D. Helser, B.S.A., M.S., Prof. Animal Husbandry, Iowa State College. The Macmillan Co. $2.90.

Farm Management—By Robert R. Hudelson. The Macmillan Co. $2.00.

Farm Management and Marketing—By V. B. Hart, Ext. Professor of Farm Management; M. C. Bond, Ext. Professor of Marketing; L. C. Cunningham, Ext. Asso. Professor of Farm Management; all of N. Y. State College of Agriculture, Cornell University. Publishers: John Wiley & Sons, Inc. (1942). $2.75.

Farm Records—By John A. Hopkins, Ph.D., Asso. Prof. of Economics, Iowa State College. Iowa State College Press. $2.50.

Forestry in Farm Management—By R. H. Westveld and Ralph H. Peck. John Wiley & Sons, Inc. (1941). $3.00.

Gardening for Good Eating—By Helen Morganthau Fox, Gardener and Author. The Macmillan Co. $2.50.

Grow Your Own Fruit—By M. G. Kains, formerly with U. S. Dept. of Agriculture; Professor of Horticulture, Pennsylvania State College. Charles Scribner's Sons. $3.50.

Hunger Signs in Crops—Published by the American Society of Agronomy and The National Fertilizer Association. $2.50.

Home Vegetable Gardening—By Charles S. Nissley, Extension Horticulturist in Vegetable Growing. Rutgers Univ. Press (1942). $1.50.

Judging Dairy Cattle—By Edwin S. Harrison, Professor of Animal Husbandry, Cornell University. John Wiley and Sons, Inc. $2.75.

Livestock Judging Handbook—By Julius E. Nordby, Asst. Prof. Animal Husb., Univ. Idaho, and W. Malcolm Beeson, Ph.D., Asst. Prof. Animal Husb., Univ. Idaho. The Interstate Printers. $2.60.

Livestock Production—By Walter H. Peters, Chief of the Division of Animal and Poultry Husbandry, Univ. of Minn. McGraw-Hill Book Co., Inc. $3.50.

Poultry Husbandry—By Morley A. Jull, Prof. of Poultry Husbandry, Univ. of Maryland. McGraw-Hill Book Co., Inc. $4.00.

Poultry—By A. R. Winter, Asst. Prof. Poultry Husbandry, Ohio State Univ., and E. M. Funk, Asst. Prof. Poultry Husbandry, Mo. State Univ. J. B. Lippincott Co. $5.00.

Pork Production—By William W. Smith, Prof. of Animal Husbandry, Purdue Univ. The Macmillan Co. $3.75.

Practical Poultry Management—By James E. Rice, Emeritus Professor of Poultry Husbandry, and Harold E. Botsford, Extension Professor of Poultry Husbandry, both at New York State College of Agriculture. Fourth Edition (1940), John Wiley & Sons, Inc. $2.75.

Practical Horse Breeding and Training — By Jack Widmer. Charles Scribner's Sons (1942). $3.00.

Repairing Farm Machinery—By Ivan G. Morrison, Asst. Professor Agri. Education, Purdue University. The Interstate Printers & Publishers. $1.80.

Sheep Production—By Levi Jackson Horlacher, B.S.A., M.A., Asst. to Dean, Col. Ag. Univ. Ky. McGraw-Hill Book Co., Inc. $4.00.

Sheep—By Levi Jackson Horlacher, Prof. of Animal Husbandry, Univ. of Kentucky. The Interstate Printers and Publishers. $2.00.

Soil Conservation — By Hugh Hammond Bennett, Chief, Soil Conservation Service, U. S. Department of Agriculture. McGraw-Hill Book Company, Inc. $6.00.

Some Common Diseases of the Horse—By George R. Conn, B.S.A.H., D.V.M., Orange Judd Publishing Co., Inc. (1942). $1.50.

Some Common Diseases of Cattle—By George R. Conn, B.S.A.H., D.V.M. Orange Judd Publishing Co., Inc. (1942). $1.50.

Soybeans—Gold from the Soil — By Edward Jerome Dies. The Macmillan Co. $1.75.

The Western Horse—Its Training, Type and Marketing. By John A. Gorman, Asso. Prof. Animal Production, Univ. of Wyoming. The Interstate Printers and Publishers. $1.65.

The Farm Primer—By Walter Magnes Teller, formerly with the Farm Security Administration, U. S. D. A. David McKay Co. $2.50.

Vegetable Crops — By Homer C. Thompson, Ph.D., Prof. Veg. Crops, Cornell Univ. McGraw-Hill Book Co., Inc. $5.00.

For the convenience of our readers, books listed may be purchased through this Department. Address Farmers Digest, Ambler, Pa.

INDEX

...al Cattle

...ower Beef Costs ..... May, 1942
...itting Steers for Show ..... May, 1942
...hy Creep Feed Calves? ..... June, 1942
...iguring the Farm's Beef Power ... July, 1942
...et Performance Be Your Beef Guide, Aug.-Sept., 1942
...hat War Means to the Cattle Feeder, Oct., 1942
...roving Beef Sires ..... Oct., 1942
...ualer Cattle Feeding ..... Nov., 1942
...hort-fed Cattle Mean More Profit . Nov., 1942
...rofit or Loss in the Cattle Business . Jan., 1943
...attle Hides ..... Jan., 1943
...ith Emphasis on Roughage ..... Feb., 1943
...merica's Meat Power Develops ... Feb., 1943
...eef Production Can Be Stepped Up . May, 1943
...ange Management ..... May, 1943
...arlier Marketing of Range Cows .. June, 1943
...revent Colds and Shipping Fever . June, 1943
...eef Cattle Feeding Trials ..... July, 1943
...eeding by Free-Choice ..... July, 1943

...nservation

...ence Row Facts ..... June, 1942
...onservation Farming and Yields .. July, 1942
...A Piece of Land ..... Aug.-Sept., 1942
...New Method of Terrace Construction, Oct., 1942
...onserve for Production ..... Nov., 1942
...utrient Quality of the Soil ..... Jan., 1943
...alt Stream Bank Erosion ..... Jan., 1943
...ur Soils in Selective Service ..... May, 1943
...ur Soils in Selective Service ..... June, 1943
...il Loss Secrets Revealed ..... June, 1943
...ubble Mulch ..... July, 1943

...ps

...rtilizing Corn ..... June, 1942
...ore Flax ..... June, 1942
...ew Crop for the South ..... June, 1942
...udan Grass ..... June, 1942
...xtending the Life of Clover Stands, Aug.-Sept., 1942
...ant Alfalfa in August ..... Aug.-Sept., 1942
...ovemegrass ..... Nov., 1942
...00 Bushels of Corn on Old Land .. Jan., 1943
...ilo—Our Forgotten Crop ..... Jan., 1943
...ops ..... Jan., 1943
...he Legumes in Seeding Mixtures . April, 1943
...obacco Plant-bed Management .... May, 1943
...ew Sudan Grass ..... July, 1943

...y Cattle

...rtificial Udder Growth ..... June, 1942
...itamin C for Sterility ..... June, 1942
...requency of Milking and Production, June, 1942
...0 Calves per Year from One Cow . July, 1942
...avier Grain Feeding to Increase Milk, July, 1942
...rth Control in the Cow Barn . Aug.-Sept., 1942
...airy Slaves Revolt ..... Aug.-Sept., 1942
...ew Methods in Dairy Cattle Feeding, Aug.-Sept., 1942
...xperiences in Breeding ..... Aug.-Sept., 1942
...are of Milking Machines ... Aug.-Sept., 1942
...reeding Goats for Winter Milk, Aug.-Sept., 1942
...hy Do Cattle Bloat? ..... Aug.-Sept., 1942
...hite Scours ..... Oct., 1942

Milking Machine Put on Time Schedule, Oct., 1942
Grazing Habits of Cows ..... Oct., 1942
Milk Production of Cows ..... Oct., 1942
The Udder and Mastitis ..... Nov., 1942
Building a Foundation Herd ..... Nov., 1942
Feeding Vitamin A to Dairy Cows . Nov., 1942
Influence of High Fat Intake ..... Nov., 1942
Better Breeding Reduces Milk Costs . Jan., 1943
Milking Machine Sanitation ..... Jan., 1943
Proteins, Minerals, Vitamins for Reproduction ..... Jan., 1943
Sweet Clover in Texas ..... Feb., 1943
New Hormone Works Wonders .... Feb., 1943
Water and Your Dairy Cattle ..... Feb., 1943
More Milkings—More Milk ..... April, 1943
Milking Machines—Washing and Care, April, 1943
Selecting the Young Herd Sire ..... May, 1943
Timed Milking Saves Labor ..... May, 1943
Nicking in Dairy Cattle Breeding ... May, 1943
Efficient Milking ..... June, 1943
Ketosis in Dairy Cattle ..... June, 1943
Emergency Feeding Hints ..... June, 1943
Why Do Cows Bloat? ..... July, 1943
Thyroprotein for Sterility ..... July, 1943
Farewell to a Tough Dairy Job .... July, 1943
More Milk Vital to Victory ..... July, 1943
Forage Milk ..... July, 1943
Dairy Goats ..... July, 1943

Farm Machinery

Portable Lumber Harvester ..... Oct., 1941
You Can Ventilate That Stable ..... Jan., 1942
Tooling Up for Soil Conservation ... Jan., 1942
Speed in Farming ..... Jan., 1942
Bale-Chute Saves Labor ..... Jan., 1942
Farm Machinery in 1942 ..... Mar., 1942
The Most from a Gallon of Gas ... Mar., 1942
Push Button Barn Cleaning ..... Mar., 1942
How to Make the Mower Work Better, June, 1942
Device Saves Baling Wire ..... June, 1942
Good Tractor Care ..... June, 1942
New Methods Save Labor in Haying, July, 1942
The Sweep Rake ..... July, 1942
Cutting Labor Corners ..... July, 1942
What Shall I Charge ..... July, 1942
Tractors in Wartime ..... Aug.-Sept., 1942
Farm Machines Fight for America .. Jan., 1943
Take Care of Your Machinery ..... Jan., 1943

Fruit

4-Leaf Clover System of Pruning . March, 1941
Date Growing ..... April, 1941
The Papaya in Florida ..... May, 1941
Soil Management in Orchards ..... June, 1941
The Carob Tree ..... July, 1941
Growing and Drying Prunes ..... Aug., 1941
New Spray for Apples ..... Dec., 1941
Modifying Biennial Bearing in Apples, Jan., 1942
Planning a Nut Orchard ..... Jan., 1942
Is Your Sprayer Ready ..... Feb., 1942
Economy in Pruning ..... Mar., 1942
Cover Crop Problems in Orchards .. July, 1942
Pruning Abandoned Fruit Trees .... Jan., 1943
Pruning Peach Trees for Production . Feb., 1943
Trends in Fertilizing Apple Orchards, May, 1943
Family-Size Fruit Trees ..... June, 1943

INDEX

Fertilizers

It's the Calcium—Not the Alkalinity, Mar., 1942
Fertilizing for Permanent Hay ..... July, 1942
Fertilizers Will Help ..... July, 1942
Lime Becomes Part of Soil ..... Oct., 1942
Manure Yields Profits ..... Jan., 1943
Putting Fertilizer in Its Place ..... Feb., 1943

Hay

Of 13 Ways of Making Hay ..... June, 1942
Hay Cutting Time Vital ..... July, 1942
Quality in Grasses for Pasture and Hay, April, 1943
Seeding Legumes and Grasses ..... May, 1943
Mow-Cured Hay ..... June, 1943
The Right Time to Make Hay ..... June, 1943

Hogs

Baby Pig Disease ..... May, 1942
Production Testing for Hogs ..... June, 1942
Vitamin B in Swine Nutrition ..... July, 1942
Fitting the Show Herd ..... Aug.-Sept., 1942
Record of Performance for Swine ... Oct., 1942
Make Hogs Heavy for More Profit .. Oct., 1942
Guard Against Soft Pork ..... Oct., 1942
New Hog Cholera Vaccine ..... Nov., 1942
Hogs on Concrete ..... Nov., 1942
Something New in Pigs ..... Nov., 1942
The Sow Herd in Winter ..... Feb., 1943
Get Them off to a Flying Start ... April, 1943
Production Testing as a Basis for Selection, April, 1943
Hog-Lot Strategy ..... May, 1943
Swine Erysipelas ..... May, 1943
Watch Out for Cholera ..... June, 1943

Horses

Remount Service Breeding Plan .. April, 1942
Watch Out for It ..... May, 1942
Power of the Horse ..... June, 1942
Wild Horses of the Plains ..... July, 1942
Care of the Brood Mare ..... Aug.-Sept., 1942
Cooperative Selling ..... Aug.-Sept., 1942
Value of Good Roughage for Horses . Oct., 1942
Jacks and Mules ..... Jan., 1943
Shoeing and Shoes ..... Feb., 1943
Cutting Horses ..... Feb., 1943
Using Horses and Mules Efficiently . June, 1943

Pastures

Grass Is Money ..... Feb., 1942
Pasture Champions ..... Mar., 1942
The Search for Better Grass ..... Mar., 1942
Good Pasture Management Pays .. April, 1942
Good Pasture Returns Dividends ... May, 1942
Planning the Use of Pasture ..... June, 1942
Combination Legumes for Grazing, Aug.-Sept., 1942
Grass Varieties to Improve Western Range, Oct., 1942
A Believer in Grass ..... Jan., 1943
Clover Pastures for the Coastal Plains, Jan., 1943
Permanent Pastures in the South .. Feb., 1943
Cow Cafeteria and New Grasses ... April, 1943
Fertilization of Pastures ..... May, 1943
They Like Lespedeza ..... May, 1943
Thin, Weedy Pastures Need Attention, June, 1943
Pastures and Their Management ... July, 1943
Brome-Alfalfa Mixture ..... July, 1943

Poultry

Chickens on Shares ..... July, 19
Sulfur and Charcoal Prevent Coccidiosis, July, 19
How Much Did Those Pullets Cost? Aug.-Sept., 19
Chicks Out-of-Season ..... Aug.-Sept., 19
Store Eggs for Lean Months . Aug.-Sept., 19
All Out Production from the Pullets . Oct., 19
The Trask Plan ..... Oct., 19
Fall Chicks ..... Nov., 19
Cull Your Hens All the Time ..... Nov., 19
A Boom in Feathers ..... Nov., 19
Finishing Turkeys for Market ..... Nov., 19
A Little More Room, Please ..... Nov., 19
Goose Raising ..... Nov., 19
A Triumph for Turkey Tenancy ..... Jan., 19
More Chicks per Hen ..... Jan., 19
Reduced Feed Costs for Poultry .. Feb., 19
New Feeds and Feeding Methods .. Feb., 19
Do You Have a Halfway Flock? .. April, 19
Electric Brooder Care ..... April, 19
Broilers Grown in Greenhouse ..... May, 19
Foolproof Hen Feeding ..... May, 19
Raising and Marketing Squabs ..... May, 19
Turkey Flock Nets $3.12 Per Bird . May, 19
Forty Million Pounds of Nitrogen . June, 19
Modern Management for Missing the Mouth June, 19
Chickens Pay Their Way ..... June, 19
Give Them Better Grass ..... June, 19
Higher Egg Quality ..... July, 19
Sunflowers for Poultry Feed ..... July, 19

Sheep

Self-feeding of Fattening Lambs .. May, 19
How Much Roughage for Sheep? .. June, 19
A Production Test for Sheep ..... July, 19
Flying Sheepskins ..... Aug.-Sept., 19
Commercial Lamb Feeding ... Aug.-Sept., 19
More Profit from Sheep on Range .. Jan., 19
Maintaining the Farm Flock ..... Jan., 19
A Sheep Feeder Checks on Supplements, Feb., 19
Suggestions for Southern Sheepmen . April, 19
It Will Save the Lambs ..... April, 19
Lambing Time ..... June, 19

Silage

Sweet Clover Silage ..... June, 19
New Methods for Grass Silage ... Sept., 19
Short Cuts in Silo Filling ..... July, 19

Rabbits

The Family Rabbitry ..... April, 19
Domestic Rabbits for Home Consumption, May, 19
Preparing Rabbit Meat ..... June, 19

Vegetables

Growing Winter Rhubarb ..... Feb., 19
Tenants Share Garden ..... Feb., 19
What's New in Vegetables for 1942 . Mar., 19
How a Champion Grows Tomatoes . April, 19
Fertilizing for Better Vegetables .. May, 19
Should Potatoes Be Planted Thick or Thin May, 19
Using Blitzkrieg on Weeds .. Aug.-Sept., 19
Growth Regulations for Celery ..... Feb., 19
Something New in Plant Growing .. April, 19
The Good Acre ..... May, 19
Plan to Dry, Store and Can ..... May, 19
Synthetic Insecticides for Vegetables . July, 19
Soysprouts ..... July, 19
New Spray for Tomato Anthracnose . July, 19

FUTURE FARMERS of AMERICA

PRIZE ESSAY CONTEST AWARDS

FIRST PRIZE:

Karl Swain, Grandview, Texas

Approved: James Warren: Voc. Agri. Instructor

SECOND PRIZE:

Robert McFate, Edenburg, Pa.

Approved: W. W. Bell, Supervisor of Agriculture

HONORABLE MENTION:

Wayne Canterbury, Athens, Illinois

Approved: W. B. Brauninger, Principal

Keith F. Schertz, Benson, Illinois

Approved: W. H. Farrell, Voc. Agri. Instructor

Orville Sauder, Pekin, Illinois

Approved: W. H. Dewell, Voc. Agri. Instructor